Virginia MEDICAL MONTHLY

OFFICIAL PUBLICATION OF THE MEDICAL SOCIETY OF VIRGINIA

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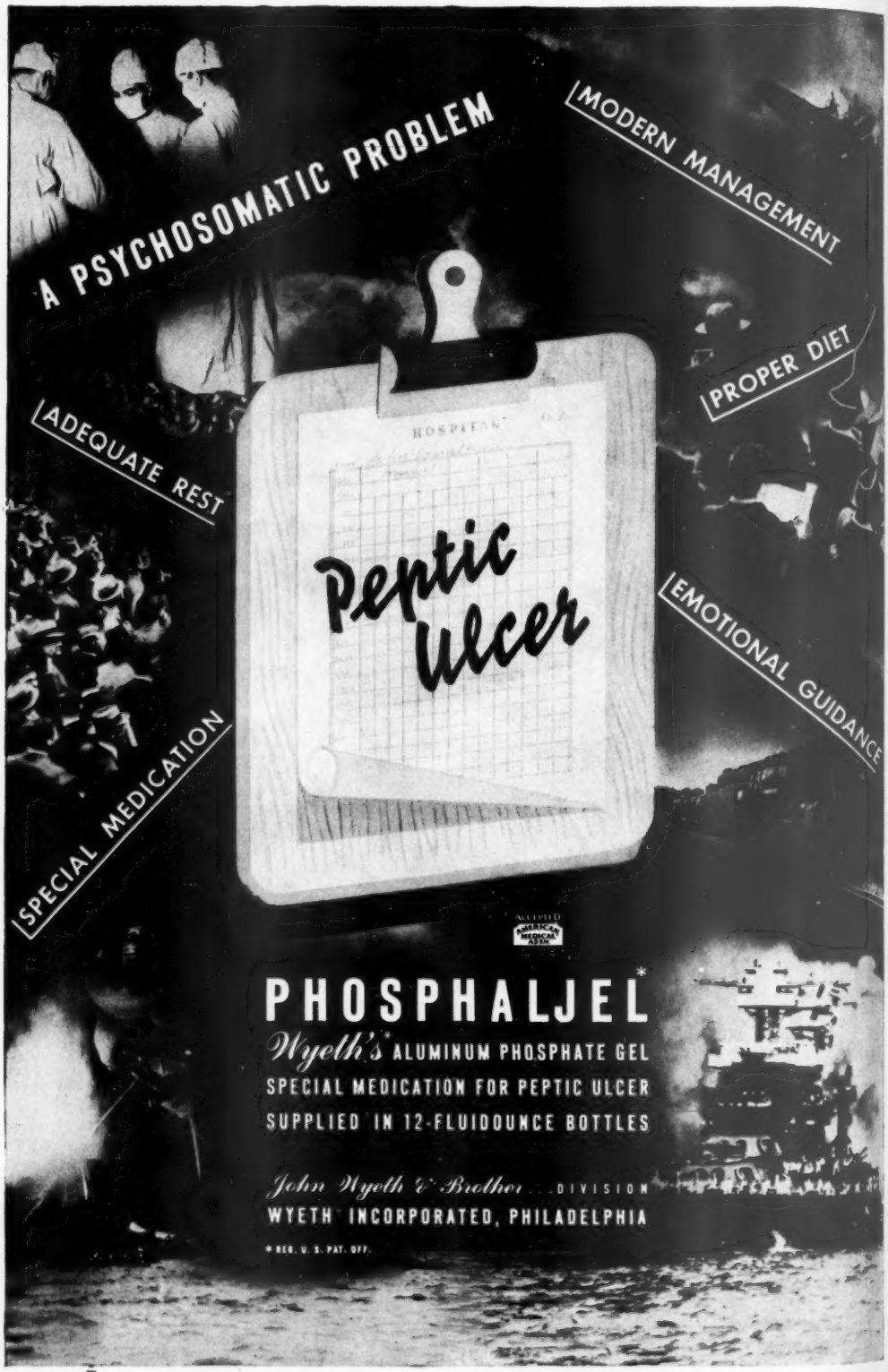
March 1944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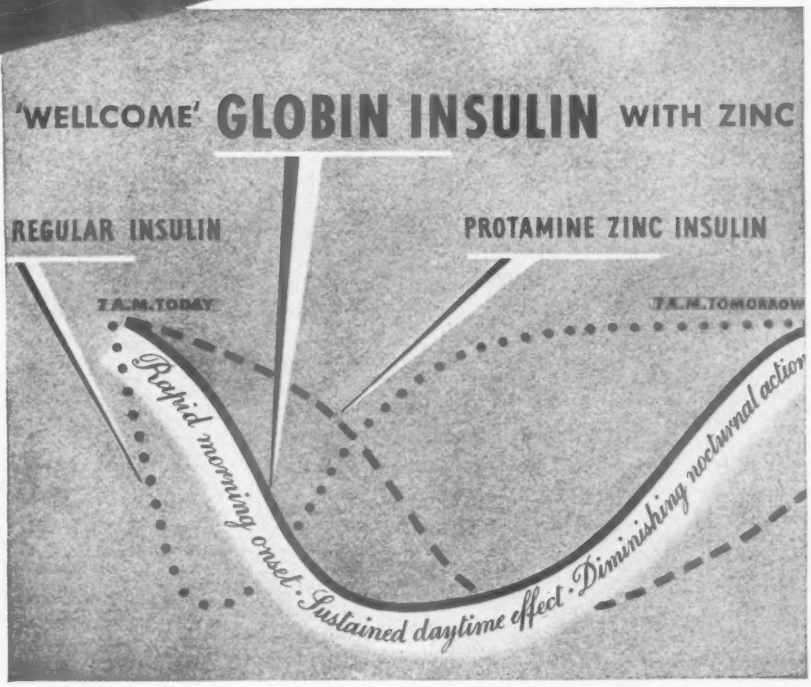

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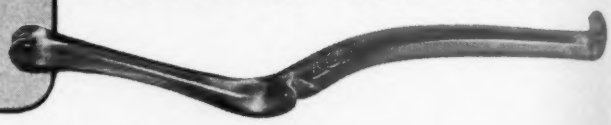

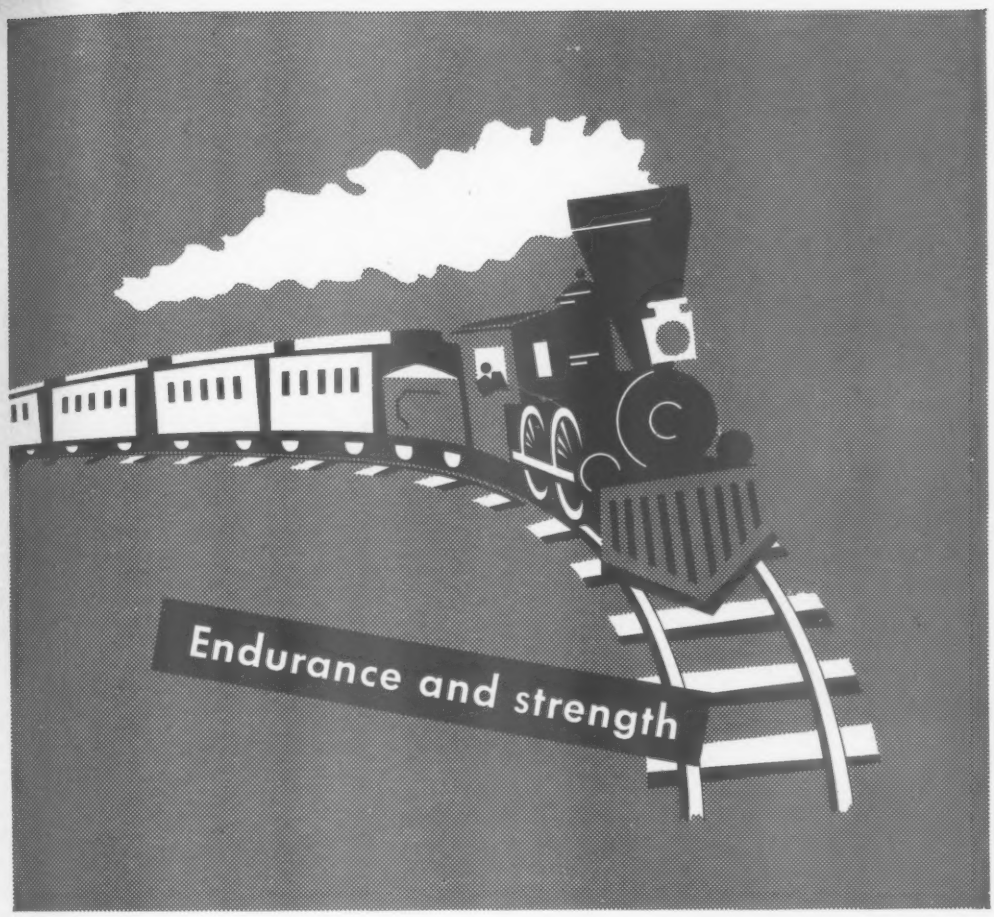

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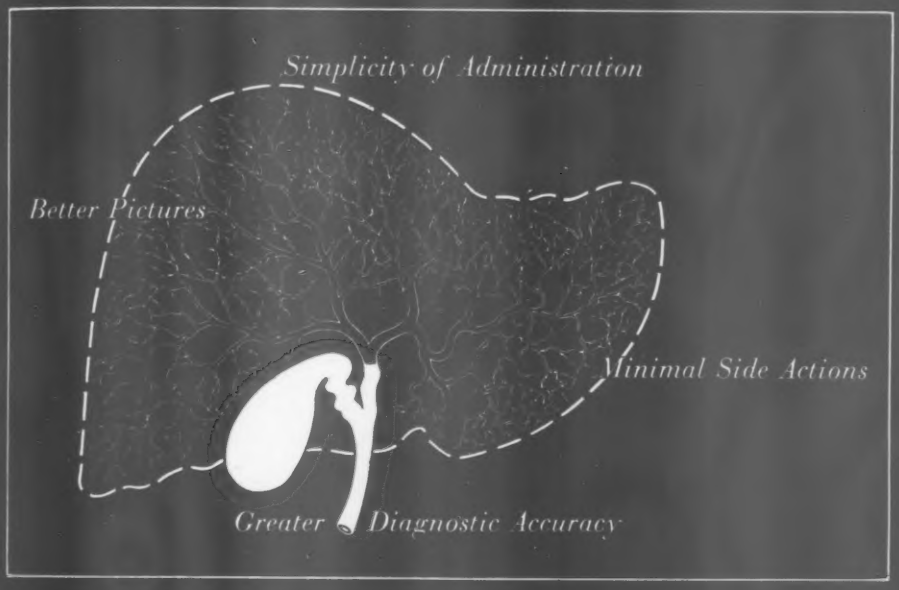

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[2]CHAIN, E.; FLOREY, H. W.; GARDNER, A. D.; JENNINGS, M. A.; ORR-EWING, J., and SANDERS, A. G.: Lancet 2: 226 (Aug. 24) 1940.

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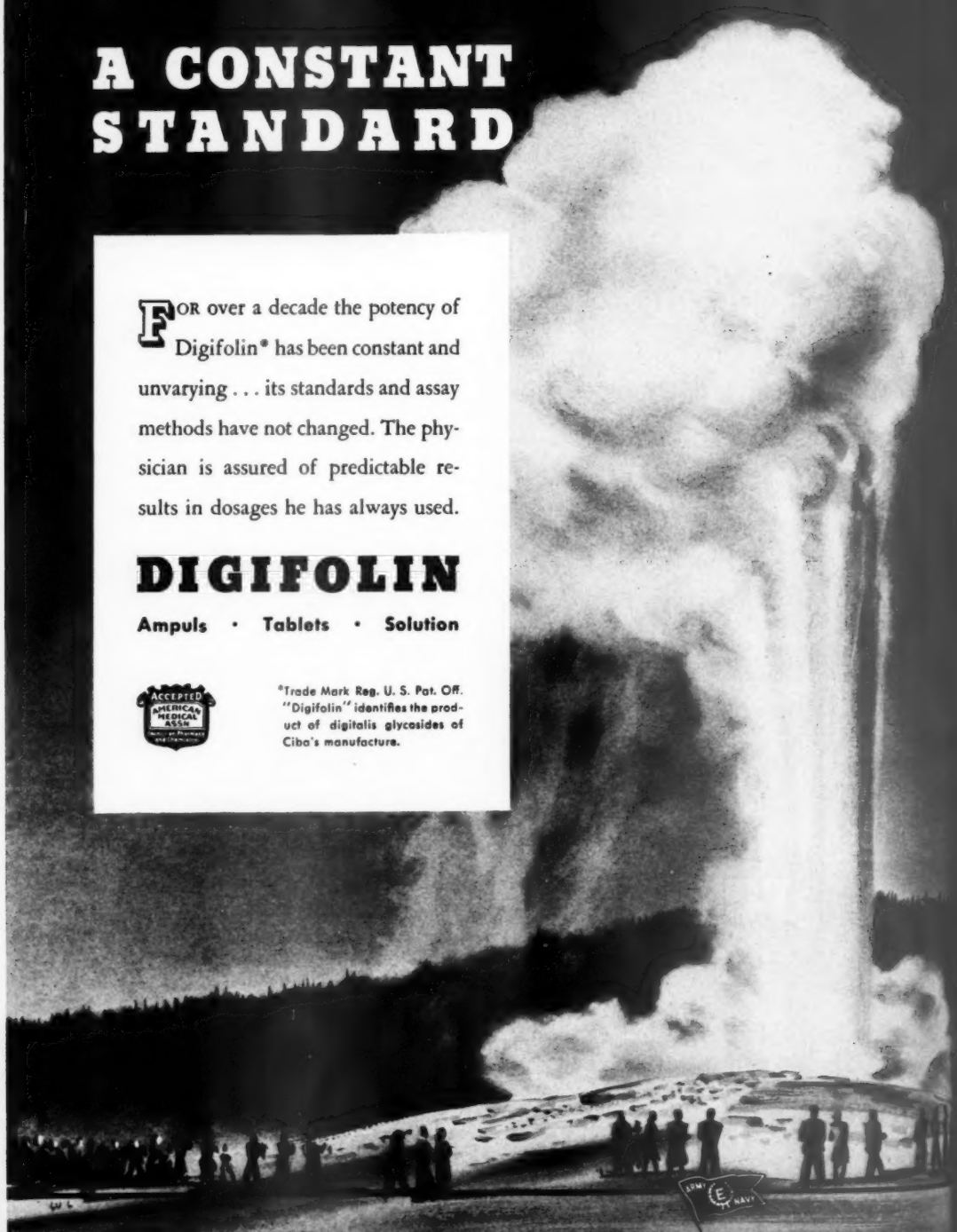

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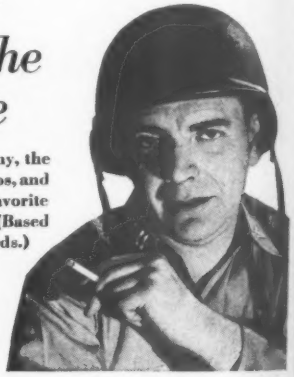

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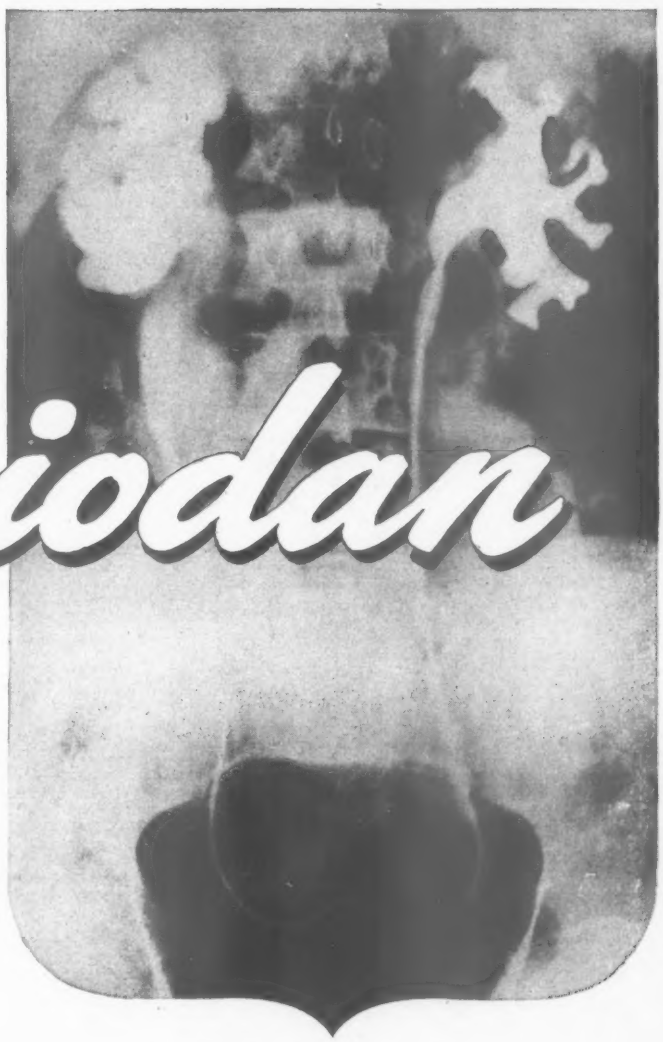

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ut so far I have learned of no other e suggestion which provides the neces- fety valve which such an arrangement would give. It would be tragic if a lot ll business concerns were wrecked and orkers thrown into idleness because of inability to cut through the red tape ed in getting their claims settled.

RESPONSIBILITIES OF CONTRACTORS

le making these statements with re- o action by the Federal authorities, I ize, also, that business concerns which war contracts have a responsibility on part to facilitate speedy settlement of ated war contracts. They have the re- bility for preparing their claims ac- y and speedily and presenting them per form. Some progress has been oward getting a recognition of the at industry must play in this respect, rrently more and more experience of ort is now being gained. The con- g services of the Government, I know, a very helpful attitude toward this sit- , and the local office of W. P. B. has hed a regional advisory service for war faced with problems resulting from termination. That is a very helpful pent.

ation to make possible the prompt nt of terminated war contracts is now. It will be unsafe to wait until a deluge of contract terminations to through legislation on short notice. roblem is too complicated to be dealt ffectively in that way.

MATERIALS FOR CIVILIAN PRODUCTION

ddition to making provision for the ent of terminated war contracts, there the task of facilitating the flow of ials for civilian production as soon as materials can be spared from war pur- I hope that we shall not have unem- ent here in Massachusetts because d materials, which are physically in ex- e in the United States, are unavailable by manufacturers as a result of leg- or administrative restrictions. The legislation vesting the priority power President, which power of the Presi- delegated to the Chairman of the War on Board, is probably adequate to the flow of materials, but it may be ry for the Congress to make sure that ministration of the priority power by ar Production Board is directed effec- oward the speedy and smooth resump- f civilian production. The War Pro- n Board should be expected to elim- limitation orders, its conservation and its allocation systems just as n the needs of the war program per-

use of their effects on plans for re- yment, I foresee that these problems ling canceled contracts and securing pplies of raw materials for civilian pro- n will presently be matters of wide- concern here in Massachusetts.

ummarize, my specific recommenda- re that legislation should be enacted r the following points:

EMENT OF TERMINATED WAR CONTRACTS

terminated contracts should be set- egotiation by the contracting agen- the Government, and the negotiated nt should be final in the absence or misrepresentation.

mpt partial payments amounting to arge percentage of the claim should d to each contractor upon submittal fied statement of the claim, subject, , to a penalty for perjury.

al settlement committees should be red to authorize partial payments delay of over 30 days occurs on the the Government agency.

4. Contracting agencies should be required to give prompt clearance of claims on work in process. There should be clear-cut procedures for authorizing the removal of Government-owned inventories and machines, with storage at Government expense, in order that civilian production may be started.

5. The dilemma of the subcontractors must be resolved. At the present time the Government exercises the right of approving all payments in settlement of subcontracts but does not assume any responsibility to the subcontractor, with the result that the subcontractor in many cases cannot secure action by either the prime contractor or the contracting agency. I suggest that the local settlement committees proposed above should be empowered to approve settlement of subcontracts if a delay occurs in approval by the contracting agency.

B. DECONTROL OF MATERIALS

1. As soon as war conditions permit, the rules for the release of scarce raw materials should be revised, with a view to facilitating the rapid resumption of civilian production.

A Magnificent Job

EXTENSION OF REMARKS
OF
HON. LOUIS LUDLOW
OF INDIANA
IN THE HOUSE OF REPRESENTATIVES

Tuesday, January 11, 1944

Mr. LUDLOW. Mr. Speaker, Indianapolis and Indiana are very proud of the great pharmaceutical house of Eli Lilly & Co., which has processed its millionth blood donation without a cent of profit. This record is in keeping with the fine, generous spirit which this firm always has manifested in the service of our country and which long ago brought to it the recognition of an Army-Navy E award. Commenting on the company's contribution to the blood campaign, which means so much in saving the lives of our precious boys, the Indianapolis News says editorially:

LILLY'S CONTRIBUTION

In the midst of charges that some concerns are making an unholy profit from war contracts it is heartening to learn that the Indianapolis laboratories of Eli Lilly & Co. have processed 1,000,000 blood donations entirely on a nonprofit basis.

In addition to performing this service at cost, the expense involved has been decreased constantly through the introduction of more efficient methods.

There certainly could have been nothing unethical if the Indianapolis pharmaceutical house had sought a minimum profit for the work it has been doing.

Donations of blood at Atlanta, Chicago, St. Louis, Detroit, Cincinnati, Louisville, Columbus and Indianapolis have been converted into live-saving plasma at the Lilly plant, involving the installation of new equipment and the employment of much additional skilled personnel.

The patriotic Americans who donated this blood, however, got nothing for their contributions and the Lilly Co. determined that its connection wiht the effort to strengthen the wounded on every fighting front should be entirely shorn of private gain. From beginning to end, it has been and is—a magnificent job.

The Gates Must Not Be Closed

EXTENSION OF REMARKS
OF
HON. SAMUEL DICKSTEIN
OF NEW YORK
IN THE HOUSE OF REPRESENTATIVES

Tuesday, January 11, 1944

Mr. DICKSTEIN. Mr. Speaker, leave to extend my remarks in the ORD, I include the following editorial the Daily Mirror of January 4, 194

THE GATES MUST NOT BE CLOSED

When Congress reconvenes on Janu it should take up the Gillette-Taft-Ba Rogers resolution.

This resolution calls for the format a Presidential commission to create m ery, in conjunction with the Unite tions, to rescue the millions of Jew are now being systematically extermi by the Nazis and their Quislings.

When the Presidential commission work, one of the first things it should to seek the abrogation of the Cham "White Paper" of May 1939.

At present, Palestine is being admin by Great Britain in conformity with t icy embodied in the "White Paper," tue of which Jewish immigration int tine is now limited and is to be pr stopped after March 31, 1944. The to be reduced to a permanent min 33 percent in the country and the land to Jews is to be practically pro

A DIRECT REPUDIATION

This is a direct repudiation on En part of the League of Nations Mandate the Balfour Declaration incorporated mandate of 1917.

According to this declaration, Palest to become a national Jewish home un protectorate of England.

In 1939, after the Jews had created ern civilization in what was practic Arabian desert, England turned h on her solemn promise of 1917.

This perfidity of Britain toward t was denounced by no one more vi than by Winston Churchill in Parlia the debate on the "White Paper" when he said:

MR. CHURCHILL'S REGRET

"As one intimately and responsib cerned in the earlier stages of our P policy, I could not stand by and see engagements into which Britain has before the world set aside for reason ministrative convenience or for the quiet life. I should feel personally rassed in the most acute manner if myself by silence or inaction to wha regard as an act of repudiation.

"I regret very much that the pledg Balfour Declaration, endorsed as it h by successive governments, and the tions under which we obtained the m have both been violated by the Gover proposal.

"I select one point upon which plainly a breach and repudiation of four Declaration—the provision tha immigration can be stopped in 5 ye by the decision of an Arab majority. a plain breach of a solemn obligation

As the Palestine Mandate was ord the League of Nations, it cannot b gated even by Great Britain herself the consent of the League.

A SOLEMN OBLIGATION

But the League did not give its con the 1939 abrogation.

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Medical College of Virginia Issue

THAT this, the March, 1944, issue of the VIRGINIA MEDICAL MONTHLY, is a special Medical College of Virginia number is the result of the suggestion and invitation extended several months ago to the dean of the school of medicine by the editor of the MONTHLY. The content of the number will be found to have had its origin in work done by members of the faculty in the laboratories, clinics, and hospitals of the College and of Richmond, and to involve several fields within both preclinical and clinical medicine. The editorial committee includes Dr. E. C. L. Miller, directing librarian, and Dr. R. J. Main, professor of physiology. It is hoped that in this way readers of the MONTHLY may better know the College, its facilities, its services, and its staff members.

The Medical College of Virginia, now in its one hundred seventh session, has played an important role in medicine, not only in Virginia and in the South but also in the nation, with alumni in all but two of the forty-eight states and in several foreign countries. As in the War between the States, when the College continued to operate to train men for service as medical officers of the armies of the Confederacy, so has the College continued its activities in other periods of emergency. In the present conflict also, the facilities of the College are in use for the training of men, at present enrolled in the Army Specialized Training Program and in the Navy College Training Program, to serve as medical and dental officers in the military services.

Glorious as the past has been, however, and difficult as the present may be, it is to the future, immediate and ultimate, that we look and for which we plan, that the place occupied by the school of medicine of the Medical College of Virginia in American medical education and service may be ever more effective. Elsewhere in this number discussion is centered in plans for the enhancement of the role played by the College in this region particularly. Perhaps it is appropriate to emphasize here that any medical center, and certainly the Medical College of Virginia as the specific example, will be able to make its maximum contribution only when it has won wholehearted support. It is our purpose to dedicate our efforts to winning this type of support for the College, that it may develop into the medical center that is possible.

Finally, to the readers of the MONTHLY, we extend an invitation to think of the Medical College of Virginia as your medical center, interested in and providing services primarily for your communities, your patients, and you. In turn, we hope that we may have your interest, advice, and support, as your contribution to the effectiveness of our services. When you are in Richmond, we would consider it a privilege to have you visit the College in order that we may know you and that you may know us. It impresses us as important that we help each other in the solution of mutual problems. Your criticisms and suggestions will be welcomed.

J. P. GRAY, M.D., *Dean.*

THE MEDICAL COLLEGE OF VIRGINIA AND MEDICAL SERVICES IN VIRGINIA

J. P. GRAY, M.D.,
Dean, School of Medicine, Medical College of Virginia,
Richmond.

I

With more than one hundred years continuous operation behind her, the Medical College of Virginia, during recent years, has come into national prominence. Survival of the period of improvement and stabilization of medical education resulting from the Flexner report was an achievement in itself. Thereafter, consolidation of the University College of Medicine and the Medical College of Virginia in 1913 assured the continuation of medical education in Richmond. During recent years, the College has outgrown the modest facilities available and in use for more than a quarter century. New and extensive buildings and equipment have been provided through the efforts of the Board of Visitors and the President over a period of more than fifteen years to bring the College to its present enhanced position. Important as physical facilities are to the development of the medical center, however, other factors, too, are of no mean import in achieving the objectives set for the College. To some of these factors and problems your attention is invited.

II

From the beginning in 1838, much of the teaching has been done by physicians in practice. In nearly every instance, the only compensation received for participation in the instruction of students was the satisfaction of fulfilling the precept of the Hippocratic oath. The time has long since passed when this arrangement can meet the need for instruction in the preclinical sciences, so that now these subjects are taught by full-time personnel. In the clinical fields, however, the physician in practice interested in and possessing competency in teaching, is still relied upon in important respects. In most instances, as before, the compensation received is materially inadequate.

Even before the Pearl Harbor incident, these circumstances operated unfavorably on investigative activities with the result that only modest medical research programs could be carried out. The important need to be met by the College heretofore, as in war time, centered in the training of young men in medicine to the end that they might enter upon practice to serve a population group at the earliest possible date. The teaching job, being of primary import, taxed the available staff to such an extent that there was, and is, too little time remaining for investigative work, even among full-time personnel.

III

The effects of war have been felt by the College before. Medical education has suffered and will continue to suffer for the duration of the present war, unavoidably, because of the need for trained young men in the military services. The military needs have been met by the procurement and assignment of younger members of the staffs of schools of medicine and hospitals, leaving these institutions with markedly decreased staffs to meet the needs of medical education under the accelerated program. At the Medical College of Virginia, one-third of the members of the faculty are on military leave so that we have fewer members of the teaching staff available to carry the load. Of at least equal and perhaps of even greater import to the future of medicine is the ultimate effect of the lowered premedical educational requirements affecting members of classes entering after January, 1945. For the duration of the war, the minimum requirement of three years of college work has been lowered to two years by mutual agreement of members of the Association of American Medical Colleges. The Army Specialized Training Program "qualifies" men for the study of medicine in a preprofessional educational experience of but five terms of twelve weeks each. The Navy College Training Program is somewhat more liberal in that it permits the experience to continue for five terms of sixteen weeks each, the equivalent of five semesters. Inasmuch as the subject requirements in the premedical sciences are maintained almost at the former level, there is marked limitation of opportunity for study in other areas believed to be important in the maturation of the candidate for the degree in medicine.

Round the calendar teaching and learning, as carried out under the accelerated program, offer the

saving of one full year. The plan had advocates even before it was adopted generally. The short-term experience of those schools in which the plan had been followed only as a war measure probably does not provide a basis of appraisal at this time, but it is the consensus of both teaching staff and student body, in this school at least, that the gain in time is offset by the loss incident to fatigue and all too short recovery periods in vacation time. There is no doubt that advantages are to be found in the plan or some modification of it, but compensating disadvantages do occur and must be dealt with if maximum efficiency is sought.

The benefits to the student enrolled in one of the training programs, however, are manifold. These are outlined, as they relate to the Army enrollee, in a subsequent article to appear in the MONTHLY. For the Navy enrollee, there is almost complete parallelism. These programs, carried on in schools providing instruction under contracts with the Army and the Navy, permit the military services to plan for and to meet their requirements for medical officers, and they permit the enrollee to study medicine without financial or other worries, particularly those worries incident to the war.

Also of import to schools of medicine is the loss of the privilege of selection of its students. It is believed that the school should have control of the selection of its candidates for the degree, and, similarly, that the student should have the opportunity of selecting the school in which he desires to study medicine. Under the two programs as they are set up, however, this relationship between school and student does not exist. Deans of schools of medicine participate in selection during the preprofessional training, but final selection is made by military officials.

These several effects of the war upon medical education can only result in less adequate opportunity for the student to prepare himself for the practice of medicine. "Excellence can be pushed" (Gregg) but unfortunately not all those given the opportunity to study medicine are of excellent caliber. The interest of the military officials, obviously, lies primarily in the supply of medical officers. Schools of medicine want to aid therein, of course, but their interest goes beyond that of preparing men for military medicine to preparation also for civilian practice when peace returns. The military officials have not indicated at any time an interest in changing the medical curriculum, however, and this is interpreted as evidence of interest in the maintenance of standards insofar as possible under existing circumstances. We look forward to the end of the present emergency when most of these conditions can be corrected, but for the present and immediate future, we must carry on in spite of difficulties. Most schools of medicine have these same problems to solve and in some instances their handicaps are even greater than ours.

IV

These, then, are some of the problems confronting the Medical College of Virginia. Their solution, important to medicine and to medical education in Virginia and in the South, lies with the College, specifically with the Board of Visitors, the administration, the staff, the students, the alumni, and interested friends. More important than the ultimate details of any plan are the fundamental principles upon which the details are based. In the present instance, pointed questions might be asked:

For what purpose does the College exist?

How can that purpose be fulfilled?

What needs exist in Virginia and in the South which might be met, in part at least, by the Medical College of Virginia?

The fundamental purpose for which the College exists lies in the training of men and women in the health services, including medicine, dentistry, pharmacy, and nursing. With particular respect to medicine, the purpose involves the training of men and women for the practice of medicine, such training to be on the broad base which permits the graduate to go into general practice after the hospital experience or to secure additional graduate and hospital training for specialized practice. Even in the two state-supported schools of medicine in Virginia, there are too few men and women in training to meet the need for physicians in Virginia communities, a need that antedated the present war by many years.

The training of men and women for service as physicians is the most expensive type of education. Minimum facilities required include buildings constructed and equipped for use as laboratories, hospital, and outpatient clinic. Adequate trained teaching and ancillary staffs are essential for satisfactory operation. Equipment and supplies needed are both extensive and expensive. Tuition and other fees cover but a fraction of the actual cost. Research must be an inherent activity of the school and hos-

pital if there is to be a medical center worthy of the name. These objectives may be achieved only if there are certain fundamental prerequisites, including: adequate financial support, appropriate physical facilities, competent personnel, group planning, an insatiable desire for knowledge on the part of each member of the team, *esprit de corps* placing medical center above self or group, teamwork, loyalty, and inspiring leadership. Money is an important factor in the plan but it is emphasized that money is not the only important item; certainly, it is not the most important resource. Attitudes are believed to be the most important single factor in the group listed. At the same time, the attitude is the most sensitive index of effectiveness and the least tangible factor operative to determine effectiveness. Certainly, disloyalty, selfishness, pettiness, and arrogance can bring chaos into an otherwise successful, happy, and efficient team, whether it be in the operating room, research laboratory, clinic or classroom.

Medical needs in Virginia, in most respects, do not differ widely from those in other states. While other states of the Union have these same problems to a greater or less degree, there is evidence to support the premise that the economic problems of the Southern States contribute to the more acute problems of medical and hospital care in those states.

V

At the annual meeting of the Seaboard Medical Association of Virginia and North Carolina in Richmond, on November 30, 1943, the Honorable Colgate W. Darden, Governor of Virginia, cited the possibility of federalized medicine unless there were tangible demonstration that the states could and would solve the problem. Governor Darden asked the Association to take an active part in the planning of suitable programs and stated that he would welcome assistance. A committee was authorized and appointed to work with the Governors of Virginia and North Carolina to attempt the solution of the problem in these two states.

There are areas in Virginia, comprised of several counties not now adequately served by physicians, hospitals, or full-time health services, in which demonstration of community effort in the provision of adequate services might be made with financial participation by the Commonwealth and the local communities. The College would be interested from two viewpoints: (a) the demonstration itself, that is, of service as a community project, and (b) opportunity for the student of medicine to see community medical, hospital, and public health services operating in a coordinated plan. Thus far there has been no adequate American experience with prepayment plans covering medical and hospital care for the non-payroll and rural portions of the population. Such an area would offer rich opportunity for Virginia to demonstrate the feasibility and worth of such plans, thereby again, as she has so many times before, leading the nation in the solution of important community problems.

VI

Medical education in recent years has developed to a high level of efficiency and the product of the modern school of medicine should be able to serve the community more effectively than did his predecessor of a generation or two ago. The present curriculum, however, is not entirely satisfactory and needs continuous revision. Since there is constant progress in medicine, there must be constant improvement in medical education. Thus far, the war has emphasized the importance of two specific fields in which a better job can be done in medical education, namely, in tropical diseases and in public health and the preventive aspects of medicine. In these two fields, particularly, the medical student of today must be proficient if he is to be the successful physician of tomorrow. In other fields, too, there must be improvement in teaching, with the utilization of new and more effective methods, preferably in small groups, with emphasis on the consideration of problems that are to be seen and dealt with in practice. It is highly desirable that the student have the opportunity of seeing private patients in a physical setting more closely related to that of private practice than that provided in the outpatient clinic. The apprentice system under certain circumstances has a contribution to offer and it should be used.

In this same connection, that is, the more nearly adequate preparation of the student of medicine to enter practice, it is believed that the hospital of the smaller community offers opportunities for training. Conditions favorable to the use of such hospitals for resident experience, for example, with benefit to the community in the form of improved service as well as to the resident himself in added experience under competent supervision from the medical center and physicians of the local community, should

not be too difficult to develop after the war, if not in the immediate future.

The educational opportunities to be provided by the medical center include graduate and post-graduate training in hospital, clinic, and laboratory. The war has interrupted the plans of many young men for graduate training beyond the now available shorter intern period of nine months, and this can result only in postwar demands which will overtax existing facilities. In Richmond, a plan has been initiated whereby the internship and resident experience are secured in several hospitals pooling their interests in intern training. Under this arrangement, the intern has the opportunity of working under the supervision of several groups of men in medicine, thereby better preparing himself for the practice of medicine.

The continuation of education beyond the hospital years, moreover, will receive more attention in the future. Continuous education, comprising short-term experience in a facility designed and constructed for the specific purpose and providing an environment favorable to an interchange of experience while student and instructor live and work together, is not a new concept, but its application to medical education has not been attempted in Virginia except in isolated, infrequent, and irregular instances. A well-planned continuing program would offer opportunity to various groups to keep abreast of new developments in medicine and related fields with a minimum of inconvenience, cost, and loss of time.

VII

The services provided by the medical center and by its staff, especially with the benefit of state support, should not be in competition with but should complement the usual medical services of the area served and operate as a resource available for the study of unusual clinical problems and primarily for the teaching of medicine, using appropriate cases therefor. Selection of those eligible to receive services within the center should be made on well-defined and sound basic principles with consistent administration of the necessary procedures with expedition, efficiency, courtesy, and friendliness. The costs of such services, both to the institution and to the patient, should be held at the lowest level consistent with the best service. There should be adequate financial support from the counties for the hospital care of those unable to provide for themselves, and appropriations of the General Assembly should cover only unforeseen deficits and that portion of the costs properly charged against education. Misunderstandings have arisen over the extent of financial support provided by the Commonwealth. The usual impression is that any resident of Virginia should be able to secure hospital care in the College hospitals since tax moneys are involved in their support. Actually, less than 15 per cent of the total budget required to operate the College hospitals comes from the General Assembly appropriations.

Adequate funds are not now available in the budgets of the counties of Virginia to cover the costs of medical and hospital care of the underprivileged. County governments should meet these needs from tax funds on the county base. The need will be met only when there is local acceptance of the responsibility. Obviously, it would be unwise for each county to provide a hospital for this type of service, but through inter-county contracts or contracts with already existent hospitals excellent care could be provided at reasonable rates.

VIII

These comments are presented with the hope that readers of the MONTHLY, including alumni of other schools as well as those of the College, will become actively interested in the solution of problems related to medical education and service, especially as these exist in the Medical College of Virginia. The status of the College as a regional medical center of education, research, and service is limited only by the extent and scope of the loyalty, confidence, and support given by those who benefit from her facilities. The Medical College of Virginia has deserved loyal support down through the years. Certainly she deserves even greater pride and loyal support now. It is our purpose to work diligently to the end that the College, under circumstances and with relationships cited herein, may provide more effective services and constantly improved and continuing educational opportunities and thereby win and hold the respect, confidence, loyalty, and active support of every individual and group benefiting therefrom. These objectives cannot be achieved by one individual or by a small group, even though great effort is put forth; their achievement will require the concerted effort of all those involved. May we depend upon your participation?

Map of Chimborazo General Hospital, C. S. A. as it appeared July 6, 1862

SAVAGE SMITH, DEL.

LITTLE has been known as to the exact location and the detailed lay out of the Chimborazo General Hospital. This hospital was built by slave labor to care for the wounded and sick of the Confederate States Army and consisted of very many one story wooden pavilions or wards. It became famed on account of the low mortality rate and the vast number of patients taken care of. As a consequence of the blockade of the Confederate States there was a great scarcity of all materials and supplies. There was also a serious shortage of personnel, including doctors, yet this hospital was managed in a most efficient way and achieved the remarkable result of lowering the general mortality to less than 10 per cent. The number of patients taken care of and the mortality rate has not been surpassed until the present World War II. The map shows that the site of the hospital on July 6, 1862, was bounded by Clay Street on the north, Bloody Run on the West and the York River Railroad on the southeast. It was situated on the high elevation of Chimborazo Hill, flooded with sunlight, swept by southern breezes and commanded a beautiful outlook. On July 6, 1862, the hospital consisted of over 100 buildings, 98 of these buildings being pavilions for housing patients. These buildings were situated in rows facing south and overlooking the brow of the hill with streets between the rows of buildings. North and east of these pavilions were situated the headquarters, kitchen or bakery, the guard house, the dead house and the latrines, which were somewhat down the hill apparently draining into Bloody Run.

Numerous wells and springs furnished the water supply. A store house, corresponding to the modern central supply depot, was in the center of the pavilions where it would be most accessible. There was a large stable to the east taking care of the horses used for transportation. The milk house or dairy was on Williamsburg Avenue just across the York River Railroad on the south.

One of the most interesting features of this map is that it contains a list of the corps of officers of the general staff, headed by Dr. James B. McCaw, Surgeon in Chief. A list of the personnel of the First, Second, Third, Fourth and Fifth Divisions, including the names of the surgeons, stewards, apothecaries and other personnel, appears below. Discoloration of the original, due to contact with a piece of black walnut, prohibited the reproduction in legible form of the names of members of the staff.

As the war progressed this hospital was greatly enlarged, overflowing into the surrounding property and a great many additional buildings were added so that ultimately it is said to have accommodated from eight to ten thousand patients.

This map is from the papers of Dr. James B. McCaw and the original is now the property of his grandson, Dr. James McCaw Tompkins. A photostatic copy of the original map is in the library of the Medical College of Virginia.

Chimborazo C.S. General Hospital
Corps of Officers

Dr. J. B. McCaw, Surgeon In Chief
Wm. E. Trahem, Clerk
Capt. Thos. E. Ferrell, Commissary

1st Division

Dr. Brown, Surgeon
" Mobley, 1st Asst.
2nd "
3rd "
4th "
Nelson Turnley, Stewart
Bernard Morris, Asst.

2nd Division

Dr. Habersham, Surgeon
1st Asst.
2nd "
3rd "
4th "
Augustus Gates, Steward
Erastus " , Asst.

3rd Division

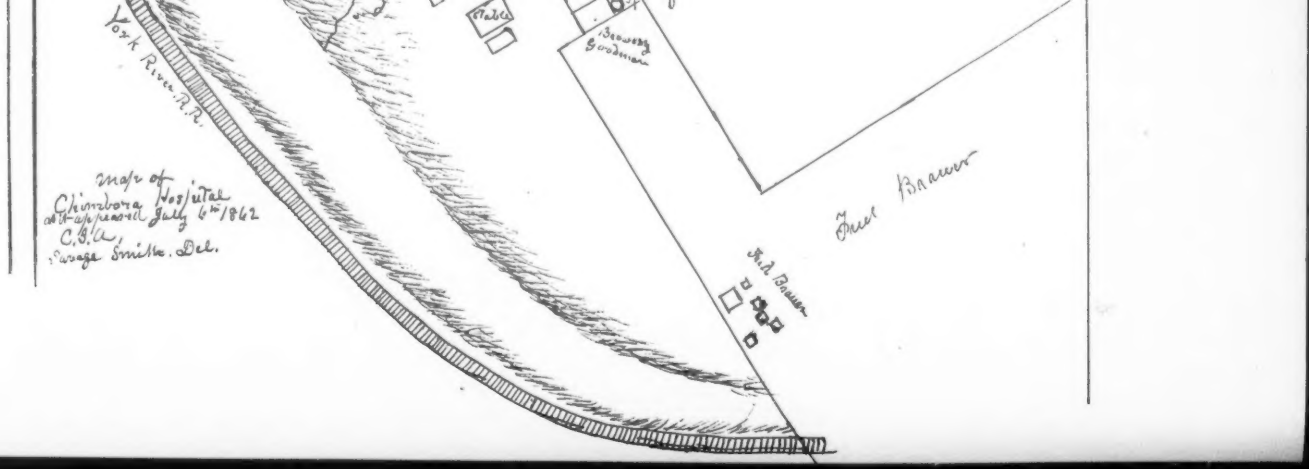
Dr. E. H. Smith, Surgeon
" David Smith, Asst.
" Washington "
" W. W. Dickie "
Wm. K. Smith, Steward
Jas. P. Shark, Asst.

4th Division

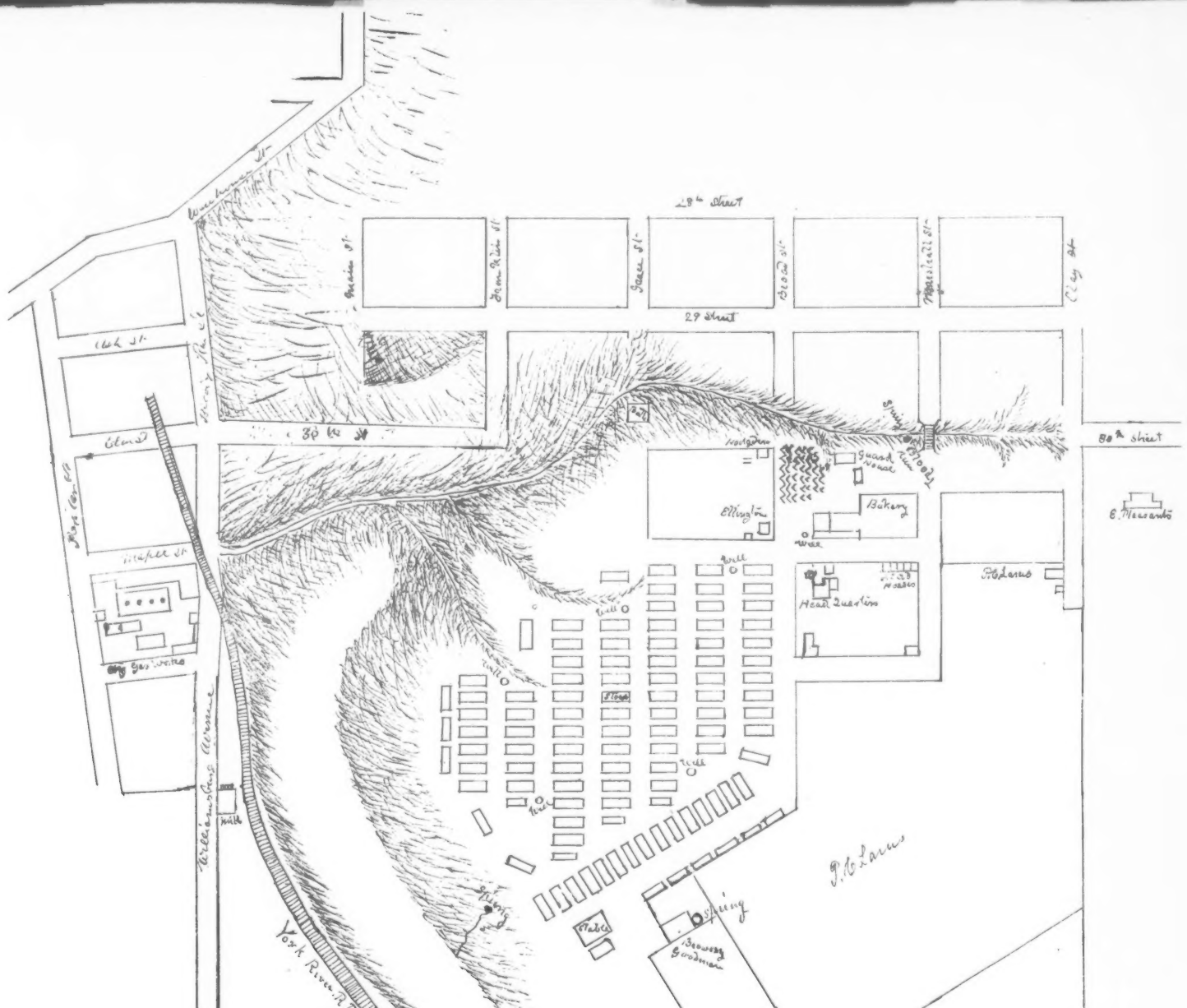
Dr. Davis, Surgeon
Assts.
Jno. Clark, Steward

5th Division

Dr. E. M. Seabrooke, Surgeon
" Frank J. White, 1st Asst.
" Jerome J. Cherry, 2nd Asst.
" Chas. J. Morse
" Trevillian
" Dunkley
Snesdorf, Apothecary
Steward
Savage Smith, Asst.



Map of Chimborazo Hospital as it appeared July 6th 1862
C. G. Ellis
Savage Smith. Del.


28th Street
29 Street
30th Street
Guard House
Bakery
Hd Quarters
Brewery
Goodman
York River R.

THE SYNDROME OF CERVICAL ROOT COMPRESSION AND BRACHIAL NEURITIS FOLLOWING LATERAL HERNIATION OF THE INTERVERTEBRAL DISC

With Comment On Central Midline Protrusions

J. L. ULMER, M.D.,
and
J. M. MEREDITH, M.D.,
Department of Neurological Surgery, Medical College of Virginia, Richmond.

INTRODUCTION. The present report is a clinical study of three cases of protruded cervical intervertebral disc, with the associated neurological findings. The protrusion was verified and removed at operation in each case, with complete recovery except in the patient with central protrusion. The first two cases represent a definite neurological syndrome due to lateral protrusion of the disc, with nerve root compression and brachial neuritis, without involvement of the cord. The third case is one of a centrally-placed protrusion with symptoms of complete cord compression, indistinguishable preoperatively from the more common true cord neoplasms, and is included only to demonstrate the variable neurological picture produced by disc lesions in the cervical region.

These lateral *cervical* protrusions are analogous to the more common *lumbar* protrusions, brachial neuritis resulting in the former, and sciatica in the latter instance. The literature is replete with reports of herniations of the *lumbar* disc, but there are very few descriptions of *cervical* protrusions, especially the lateral protrusions with only the nerve root syndrome. Semmes and Murphey[1] recently reported 4 cases of lateral cervical protrusions at the sixth cervical disc space, with compression of the seventh cervical nerve, 3 of which were verified at operation. In each of our 2 similar patients, it was the eighth cervical nerve root which was compressed at the seventh cervical disc space. Stookey reported in 1928,[2] and in 1940,[3] three different neurological syndromes which could result from herniation of the cervical intervertebral disc; that of unilateral cord compression, that of bilateral cord compression, and that of nerve root pressure alone without cord involvement (mildest type). Case 3, herein reported, demonstrates, during the various periods of the history, all three of the syndromes described by Stookey.

CASE 1

SUMMARY OF CASE. A 43-year-old white shipyard worker was admitted February 27, 1943, and discharged March 15, 1943. Immediate onset of severe pain in posterior part of left shoulder, with radiation into precordium and down left arm, followed an injury to neck six months before admission. The pain was associated with intermittent bouts of stiff neck. It was intensified by coughing, sneezing, straining, and all motions of neck. Removal of ruptured disc on the left side between C.7 and T.1 vertebrae produced complete relief.

History. Immediate onset of severe pain in the posterior part of the left shoulder with radiation into the precordial region, and down the left arm, was experienced in August, 1942, when the patient attempted to lift a ramp on a barge, using his left shoulder as a lever. The precordial pain was never so severe as the shoulder and arm pain, and disappeared in several days, whereas the shoulder and arm pain has been continuous. Together with the shoulder and arm pain, he has had intermittent bouts of stiff neck. Since November, 1942, the pain has radiated down into the ulnar side of the left hand with associated numbness of the little, ring and middle fingers, and some weakness of hand grip. The pain is intensified by coughing, sneezing, straining, and all movements of the neck, especially extension and rotation of the head to the left, by lying flat on his back, and by shrugging his shoulders. He can sleep only when lying on his right side. Supporting the left arm with his right hand usually brought relief. He was studied in another hospital in December, 1942, where x-rays of the cervical spine and lumbar puncture were reported to him as being normal. He was told he had brachial neuritis, and was given physical therapy without benefit. Since the onset, the pain has been agonizing and disabling, completely preventing him from working in the shipyard.

Examination. General medical examination revealed no significant abnormality. The patient pre-

ferred to lie in bed on his right side, and, when lying on his back, he complained of severe pain in his left shoulder and arm. There was no doubt that the patient had severe pain. His neck was held moderately rigid, and slightly flexed. All passive movements of the neck, especially extension and rotation to the left, caused pain, as did traction on the left arm. There was hypoesthesia over the ulnar border of the left hand including the little, ring, and middle fingers. There was no tenderness over either scalenus tendon, or circulatory disturbance in either hand. Firm pressure over the seventh cervical interlaminal space on the left side produced severe local pain with radiation into the left supraspinatus region and down into the ulnar border of the left hand, whereas pressure on the opposite side or at any other level of the cervical spine caused no pain. Bilateral jugular compression did not intensify the pain. There was slight weakness of grip in the left hand. The deep tendon reflexes were normal. The blood pressure was normal in each arm. X-ray examination of the cervical spine showed no evidence of bony abnormalities. Lumbar puncture revealed normal dynamics. Examination of the spinal fluid showed 55 mg. protein per 100 cc., 1 leucocyte per high power field, and a negative Wassermann. One cc. of iodized oil (Descendant Lipiodol), introduced into the subarachnoid space by cisternal puncture, broke into globules, and no helpful information was obtainable from fluoroscopic examination. The preoperative diagnosis was that of an intraspinal lesion between vertebrae 7C. and 1T., with compression of the eighth cervical nerve root on the left; most likely a protruded disc. An exploration of the spinal canal was advised, and the patient readily agreed to this, stating "I would be willing to have my arm cut off to get rid of the pain."

Operation. On March 1, 1943, a left partial hemilaminectomy of the seventh cervical and first dorsal vertebrae was performed by Dr. Coleman, exposing the eighth cervical root as it coursed out through the intervertebral foramen. The root was swollen and tense, and appeared to be displaced backward by an underlying mass. Upon retracting the root away from the mass a typical herniated disc was exposed presenting quite laterally and compressing the root without indenting the dural sac. The capsule of the disc was incised and at once there was extruded the contents of the herniated nucleus pulposus under pressure. The remaining nuclear material was removed with a Kelly hemostat, and the nerve root was thus completely decompressed.

Post-Operative Course. Following the operation, the patient was immediately and dramatically relieved of his pain. The sensory disturbance (hypoesthesia) did not completely disappear, but at the time of discharge, on the fourteenth post-operative day, the strength in his left hand had completely returned. Three months following operation, he was able to return to his former occupation. A checkup examination on December 5, 1943, revealed no sensory or motor disturbance in the left hand or elsewhere, and there has been no recurrence of his pain.

CASE 2

SUMMARY OF CASE. A twenty-seven-year-old white woman was admitted March 26, 1943, and discharged April 11, 1943. There had been spontaneous severe pain in the posterior aspect of the left shoulder for one year, with radiation into the left arm and hand. This was associated with intermittent bouts of stiff neck. The pain was intensified by coughing, sneezing, straining, and all motions of the neck. Removal of a left-sided ruptured disc between vertebrae 7C. and 1T. produced complete relief.

History. In March, 1942, the patient first noted pain in the posterior aspect of the left shoulder, with radiation down the left arm to the elbow, associated with intermittent bouts of stiff neck. The pain was most severe in the region of the elbow. *There was no history of acute injury.* Since the onset, with the exception of an unexplained free interval from September to December, 1942, the pain has been continuous.

During the summer of 1942 the patient was unable to lie down because this position increased the pain, and for three months she slept in a sitting position in a chair, supporting her left arm and shoulder with her right hand, or on the arm of the chair.

The pain was aggravated by coughing, sneezing, or straining. All movements of the neck, especially extension and rotation to the left, likewise intensified the pain. She had not noticed any coldness of the left hand, but recently there had been a prickly feeling of the left little, ring, and middle fingers.

On the night before admission, for the first time, she had severe pain in these fingers. She was unable to carry any weight in her left hand because it increased her pain. Lowering of the shoulder girdle accentuated the pain, while elevation of the

shoulder gave relief.

At the onset of the pain she was advised that it was neuritis and had her tonsils removed without elimination of the pain. Since onset, the pain has been agonizing and disabling.

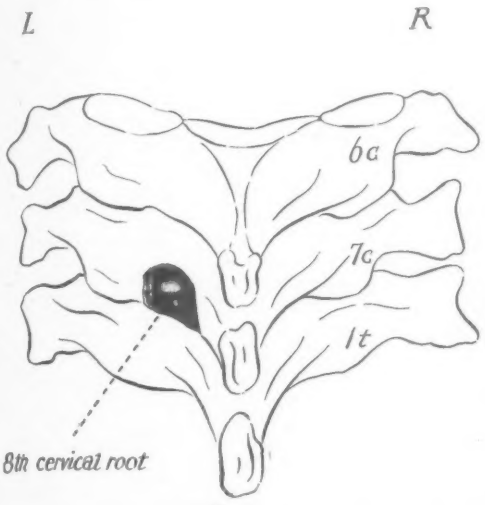


Fig. 1.

(a) Case 2. Artist's drawing at time of operation. Eighth cervical root on the left side has been exposed following removal of a small amount of bone from inferior border of left seventh cervical lamina. The root appears to be under tension from a mass anterior to it.

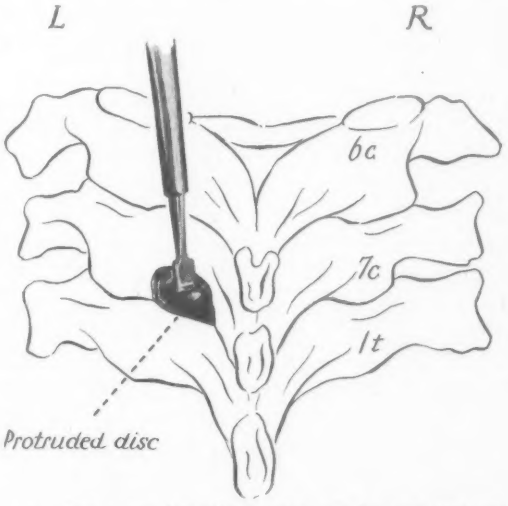
Examination. The general medical examination revealed no significant abnormality. There was no doubt that the patient had genuine pain. The neck was held rigidly, and all passive movements, especially extension and rotation to the left, as well as downward traction on the left arm, intensified the pain. *Firm pressure over the seventh cervical interlaminal space on the left side produced excruciating local pain with radiation into the dorsum of the left hand,* duplicating the pattern of her pain radiation. Pressure on the opposite side, or at any other level, did not cause pain. Pressure over the insertion of the left scalenus anticus tendon also produced pain with radiation into the left arm, but not so severe as the pain described above, while pressure on the right scalenus anticus tendon produced no discomfort. There was no weakness or atrophy of the left hand, nor was there any objective disturbance of sensation in the arm, hand or fingers. The tendon reflexes were normal. There was no temperature change in the hand, nor was any circulatory disturbance noted.

X-ray examination of the cervical spine was normal, revealing no evidence of cervical rib or arthritis.

A lumbar puncture was not performed because of the clinical resemblance to Case 1, operated upon about four weeks previously (Vide supra).

From the history and distribution of the pain, together with the palpable tender point as described, and the clinical similarity of this case to Case No. 1, a diagnosis of rupture of the intervertebral disc at the seventh cervical interspace on the left side was made, with compression of the eighth cervical nerve root.

Operation. On March 27, 1943, a partial hemilaminectomy was performed by Dr. Coleman, exposing the sixth and seventh cervical interlaminal spaces on the left side. A small portion of the two adjacent laminae of vertebrae 7C. and 1T. was removed, and, when the ligamentum flavum was resected, the eighth cervical nerve root was exposed (fig. 1a.) It was flattened and displaced backward by an underlying mass. The root was carefully lifted away from the mass and a ruptured disc about one-half inch in diameter was found (fig. 1b). The capsule of the disc was incised and the nuclear material extracted without difficulty, the nerve root being completely decompressed.



(b) Case 2. The left eighth cervical root has been lifted and retracted cephalward exposing the underlying protruded seventh cervical disc.

Post-Operative Course. Following the operation, the patient was immediately and completely relieved of her pain. She was discharged from the hospital

on the fourteenth post-operative day. A letter from the patient on December 9, 1943, states that she has had no recurrence of the pain, and is entirely relieved.

COMMENT ON CASES 1 AND 2

Both of the above cases present a definite neurological syndrome produced by *lateral* herniations of the seventh cervical intervertebral disc with compression of the eighth cervical nerve root analogous in every way to the much more common lumbar protrusions producing sciatica. In Case 1, trauma was apparently the precipitating factor, while in the other (2), no history of trauma was elicited. In addition to the shoulder, arm, and hand pain, the first patient complained of precordial pain which disappeared in a few days.

Recently, Semmes and Murphey[1] have described four cases, all of which had unilateral herniations of the sixth cervical intervertebral disc compressing the seventh cervical root. Every one of their patients had anterior chest pain closely simulating coronary occlusion or angina pectoris, two of the patients being physicians.

Both of our patients (Cases 1 and 2) complained of subjective sensory loss in the middle, ring, and little fingers, but only in the first case was there objective sensory loss in this region. In the first case, there was weakness of the left hand grip, while the second case had no such weakness. Otherwise, the two cases were identical.

As emphasized recently by Coleman[4] and by Spurling and Grantham,[5] it is true, perhaps, that many cases diagnosed as demonstrating the scalenus anticus syndrome, and not relieved by section of the scalene tendon, are actually cases of herniation of a cervical disc or other cervical spine disease. Such a lesion should be classified as an example of the secondary or reflex scalenus anticus neuro-circulatory compression syndrome, requiring, for its cure, removal of the herniated disc rather than section of the scalene tendon. On the other hand, it is certainly true that there are many cases of primary scalenus anticus neuro-circulatory compression, not due to any remote lesion, requiring for their cure, simple section of the scalene tendon.

It is important to have x-ray films made of the cervical spine in all cases of brachial neuritis, whether or not the individual case demonstrates the scalene syndrome, in order to rule out cervical spine disease (tuberculosis, cervical ribs, traumatic lesions, metastatic lesions, etc.) as the primary cause of the brachial neuritis, rather than compression of the brachial plexus by the scalene tendon or other more peripheral lesions.

A very important diagnostic point, too little emphasized in the literature, in our opinion, is the presence of localized tenderness to firm pressure applied by the examiner's thumb over the suspected interlaminal space, with radiation of pain into the adjacent extremity, whether lumbar or cervical. Particularly would we emphasize its importance in *cervical* protrusions; in the two cases cited above, it was only by this simple test that precise surgical localization was possible. We believe that the complete absence of this sign is rather strong evidence against the presence of a laterally situated herniated disc at any level of the spine.

CASE 3

SUMMARY OF CASE. A thirty-eight-year-old colored male convict was admitted July 31, 1942, and discharged September 22, 1942. A minor injury to the neck in 1935 was followed by neck and right shoulder pain which promptly cleared up but recurred intermittently at long intervals to involve both shoulders with some radiation into the hands, especially the right hand. Three months prior to admission, he experienced pain in the neck and both shoulders with radiation to both hands which was continuous for three weeks. He then rapidly developed paralysis of the right leg with numbness of the left leg. Three weeks later, there occurred progressive weakness of the left leg associated with numbness of the right leg. Following lipiodol study, a diagnosis was made of a cervical intraspinal mass lesion. A centrally-placed herniated nucleus pulposus at the sixth cervical disc space was removed at operation.

History. Following an apparently trivial injury to the neck in the course of a football game in 1935, the patient experienced pain in the neck which radiated down to the right shoulder. This pain subsided after a few weeks, but recurred at intervals until admission. It was aggravated by coughing, straining, sneezing, and movements of the neck. Occasionally, it radiated to the left shoulder and down both arms to the ulnar sides of the hands, especially the right hand. Three months prior to admission, the pain in this distribution became continuous for three weeks, following which, over a period of a few days, there developed complete paralysis of the right leg and numbness of the left leg. Within three weeks, paralysis of the left leg and numbness of the right leg occurred. Partial

urinary retention, with marked obstipation, developed.

On admission, neurological examination revealed complete spastic paraplegia, extensor weakness of both forearms and bilateral weakness of hand grip. There was complete sensory loss of pin prick appreciation on the left side, and dense hypoesthesia on the right side up to dermatome 8C. anteriorly. There were hyperactive tendon reflexes of the lower extremities with bilateral sustained ankle clonus and bilateral plantar response to the Babinski test. Tendon reflexes in the arms were normal. Functional review of the cranial nerves revealed no abnormalities, and there was no Horner's syndrome. There was tenderness on palpation over the spinous processes of 6C., 7C., and 1T. vertebrae, and bilateral jugular compression produced severe pain in the lower cervical spine with radiation to the right shoulder. A Queckenstedt test, with the spinal puncture needle in the third lumbar interspace, revealed a complete dynamic (subarachnoid) block. Examination of the lumbar spinal fluid showed 180 mgm. of protein per 100 cc., 4 cells to high power field, and a negative Wassermann reaction. Iodized oil (Descendant Lipiodol, 1.5 cc.), introduced into the subarachnoid space via cisternal puncture, revealed, under the flurorscope, an incomplete block at the level of the sixth cervical intervertebral disc (fig. 2). A preoperative diagnosis of extradural spinal cord tumor at C.6 vertebral level was made.

Operation. Laminectomy was performed on August 7, 1942, at the sixth and seventh cervical and first dorsal vertebral level by Dr. Ulmer. Upon opening the dura mater, it was evident that there was a mass anterior to the spinal cord. Gentle retraction of the spinal cord to the left exposed a mass anterior to the ventral dura, protruding centrally and to the right. Through a small paramedian incision in the anterior dura, a mass of fibro-cartilage, apparently extruded from the sixth intervertebral space, was identified and removed.

Post-Operative Course. Following a smooth postoperative convalescence, neurological examination showed normal sensation in the legs and trunk, except for non-perception of vibratory stimuli in the legs and feet. There was hypoesthesia over the ulnar aspects of the forearms and hands. Bladder and rectal sphincters were functioning normally. Voluntary movements of all muscles of the legs, although weak, were present. Examination three months following the operation revealed marked increase of motor power in the legs, although the gait was characteristic of spastic weakness of the legs. The sensory loss previously noted in the upper extremities had disappeared, although there remained

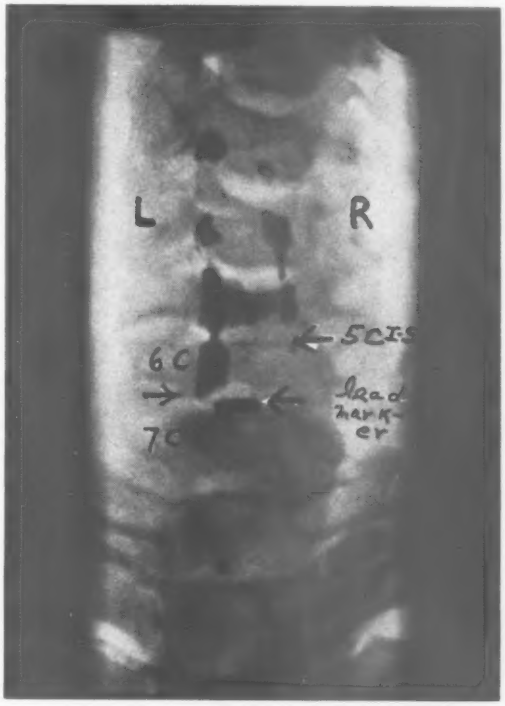


Fig. 2.
Case 3. Cisternal lipiodol (1.5 cc). The lead marker (placed preoperatively) indicates the location of the centrally protruded sixth cervical disc which, presumably, extends more to the right than to the left side. The patient was in an erect position when this film was made.

slight bilateral weakness of each hand grip. The patient is now working as an orderly in the prison (January, 1944).

COMMENT ON CASE 3

This patient presented a clinical picture indistinguishable (both by clinical examination and by lipiodol studies) from a true extradural spinal cord neoplasm. However, the history of trauma together with the long duration and the intermittency of symptoms are more suggestive of a protruded disc than of tumor. The pathogenesis is identical in all three cases, the third case differing from the other two in this paper only in the location and extent of the protrusion.

As described by Stookey, the disc in this case first appeared apparently to the right side of the sixth cervical interspace, producing the syndrome of nerve root pressure alone as in Cases 1 and 2 herein reported, followed by a Brown-Séquard syndrome, and eventually the fibrocartilaginous mass herniated through the entire intervertebral space, causing a complete spastic paraplegia and bilateral numbness to dermatome level 8C.; that is, Stookey's "syndrome of bilateral ventral pressure". In other words, this patient's lesion ran the whole gamut of possibilities that a protruded cervical disc may produce, from the milder unilateral syndromes to the most severe pressure on the cord itself (fig. 3).

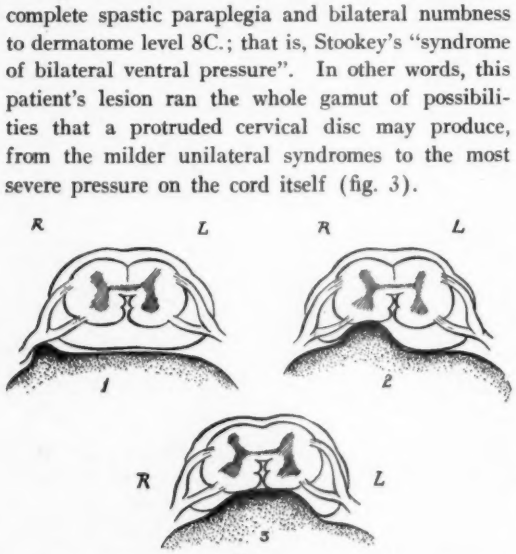


Fig. 3.

Case 3. Schematic drawing demonstrating the probable progression of the herniated disc in Case 3 (see history).
(1) The early root syndrome in the right arm and shoulder.
(2) The Brown-Séquard syndrome with weakness on the right side and numbness on the left (intermediate phase).
(3) The final phase (at time of operation) of complete spastic paraplegia (modified from Stookey B., *Arch. Surg.*, **40**: 420, Mar., 1940).

SUMMARY

Three cases of protruded cervical intervertebral disc, with the associated neurological findings, are presented. The first two cases are examples of nerve root compression producing unilateral brachial neuritis alone without cord involvement; the third case is that of an eventual massive central protrusion producing complete paraplegia and subarachnoid block.

In the lateral protrusions (Cases 1 and 2), the exact location of the lesion in the cervical spine is determined more by clinical examination than by myelography. Localized point tenderness at the involved interlaminal space (whether cervical or lumbar) is stressed as the most important clinical finding; its absence is rather strong but not unequivocal evidence against the presence of a disc.

The clinician must carefully avoid the error of overlooking lesions of the cervical spine (undiagnosed protruded intervertebral discs) as causative factors in the scalene neuro-circulatory compression syndrome. Relief of such symptoms can be achieved only by effective treatment of the cervical spine lesion rather than by section of the scalene tendon. It is suggested that x-ray examination of the cervical spine be made in all cases of the scalene syndrome (brachial neuritis), in order to avoid such an error in diagnosis and treatment, just as films should always be made of the lumbosacral spine in every case of sciatica.

Post-operative relief of symptoms should be excellent in all patients with cervical laterally-placed protruded intervertebral discs (brachial neuritis alone), removed by means of a hemilaminectomy (Cases 1 and 2). When the disc compresses the cervical cord itself to the extent of producing a complete paraplegia, complete relief, post-operatively, is scarcely to be expected (Case 3).

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A REVIEW OF RECENT EXPERIMENTAL WORK ON PERIPHERAL NERVE INJURIES

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Injuries to peripheral nerves in civil life are infrequent, but during war times the medical profession has to take care of a large number of injuries involving sensory, motor, and mixed nerves (up to 3 per cent of the total number wounded). The efficient treatment and rehabilitation of wounded with nerve injuries is important because military efficiency requires an early return to active duty if possible. Still more significant is correct treatment in regard to the return of these men into civil life. Therefore, the present war, like the preceding world war, has stimulated not only clinico-neurologic research concerning nerve injuries, but is giving impetus to a large number of animal experimental studies. As far as the latter work is of any importance for the treatment of nerve injuries, its results are incorporated in this report.

In our age of accelerated mechanization with its growing number of traffic and industrial accidents, the incidence of nerve injury in civil life will increase. It is to be hoped that the lessons learned by the experience and the research of the present war will not be neglected so quickly as those of World War I.

The two main functions of the peripheral nerves are the centrifugal transmission of motor impulses and the centripetal transmission of sensory impulses. Which of these two is most impaired in a given nerve injury, depends on the anatomical relations of the nerve or nerves involved. Surgical treatment for the repair of the nerve is the same for both functions, but rehabilitation of patients with motor nerve injuries offers some further problems.

PHYSIOLOGY AND PATHOLOGY OF NERVE DEGENERATION AND REGENERATION

The loss of the function of a nerve is due either to anatomical interruption or to compression. Only in the latter case may spontaneous recovery occur. Since despite all efforts, no clinical method has been developed to discriminate between these two types of injury, and since nerve block due to temporary compression is rare in war injuries, immediate surgical exploration of the nerves involved is advisable. According to the findings, either the cause of the compression should be removed or the nerve sutured if severed. The degeneration and regeneration of severed, and then well sutured nerves, is very similar to that of nerves functionally interrupted by compression or crushing. In the peripheral stump of the nerve, the myelinated fibers bcome fragmented, and the pattern of the nerve is maintained only by the endoneurium and neurilemma. The Schwann cells increase in number and amount of protoplasm. Macrophages enter the Schwann tubes and remove the remains of axons and myelin. In the central stump of the severed nerve, after rather short and only partially degenerative changes of the myelin and of the axons, the latter start to outgrow in a centrifugal direction. In simple compression degeneration of the nerve, the axon cylinder tips grow along their old neurilemma sheaths, now more or less transformed into Schwann tubes. In nerve sutures, the outgrowing nerve fibers have to traverse the suture scar. This is facilitated by Schwann cells which have emerged from the end of the peripheral stump into the scar tissue. If an axon cylinder tip reaches a Schwann tube of the peripheral stump, further growth occurs along its inner wall.[1, 2, 3] The difference in rate and completeness of nerve regeneration after compression as compared to that after severance and suture, is probably due mainly to the obstacle added by the suture scar. In regeneration after crushing, the peripheral stump of a rabbit nerve contains finally the same number of fibers as the central stump, and the fibers are more or less of normal diameter. However, after section and suture, the number of fibers in the peripheral stump and their diameters are still diminished after a year, although complete functional recovery was attained in two hundred days.[4] The delay before the central fibers start to grow out is longer in suture, than in compression degeneration, and the final rate of growth in the peripheral stump is slower than after compression or crushing.[5, 6] The better restoration after compression injury has been utilized with apparent success to improve function in nerves weakened by destruction of some of their

spinal roots. If besides section of some roots, the rabbit nerve was crushed, final recovery of muscle forces was superior to the control side where only the roots were sectioned.[7] The rate of regeneration decreases with the age of the animals.[8] The velocity of fiber growth in the peripheral stump in the experimental animals is distinctly higher than 2.5 cm. per month, the value generally accepted as an average for human nerves. However, recently nerve fiber growth of more than 5.0 cm. per month has been observed also in man.[9]

The outwandering capacity of the Schwann cells from the peripheral stump is, according to tissue culture studies, at its peak about twenty days after section of the rabbit nerve.[10] Corresponding observations have been made in histologic studies comparing repair of primary and delayed sutures. However, delaying the suture did not improve functional recovery, probably due to the fact that medullation of the new nerve fibers is slower in delayed suture. But these experiments demonstrate that for the rabbit, delay of one or two months does not prejudice nerve regeneration, while longer delay produces conditions liable to retard and endanger complete functional recovery.[2]

NEW SUTURE METHODS

The importance of freshening the nerve ends and of their exact funicular apposition without any tension or torsion, in securing the best possible functional return after nerve suture, is well known from the experimental studies during and since the last war. However, our most meticulous care in these respects will be more or less fruitless if the suture scar interferes too much with the outgrowth and orientation of the central fiber tips. Undesirable cellular and fibrous reactions can be minimized by the choice of the suture material. The most favorable is woman's hair.[11] In making the sutures, it is impossible, particularly in smaller nerves, to pass through the nerve sheaths without lacerating some nerve bundles. Therefore, attempts have been made to stick together the stumps with sticky gels. For this, a "glue suture" of either cockerel plasma,[12] autologous plasma,[13] or concentrated acacia solution fortified with thiamin and B complex[14] has been used in rabbits, dogs, and monkeys. The new fibers grow distinctly faster across such a junction than across the scar of the most perfect suture. This glue method has been found applicable to man,[15] especially if tension on the nerves is avoided by fixation with bridge sutures across the nerve stumps. Another new method is the splicing of the severed nerve ends by sealing them into a common tightly fitting sleeve of artery from another animal of the same species.[16] If fresh arteries are used, their reaction to epinephrine may produce compression damage to the nerve. To avoid this, frozen and then rehydrated arteries[17] have been used with success in rabbits, cats and monkeys.

REPAIR OF NERVE GAPS

In war wounds, a good approximation of the nerve stumps cannot be obtained in many cases on account of destruction of the nerve for a considerable length. To bridge such a gap is essential for restoration of function. By mobilization of the nerve stumps for a long distance above and below the lesion, by transposition of the course of the nerve, and by choosing favorable joint positions, astonishingly large gaps can often be closed by primary suture. If this can be done with not too much tension, the results are more promising than by any other method. "Nerve crossing" is advisable only in special circumstances. *"Suture à distance"*, "tubulization", or "nerve flaps" are unsatisfactory. However, a modified flap technic, the "sliding sleeve graft" gave promising result in monkeys.[18] A cylindrical segment, a little longer than the gap, embodying the nerve sheath and underlying nerve fiber bundles, is prepared from the peripheral stump and moved proximally into apposition with the central stump. If end to end suture is impossible, bridging the gap with autografts carefully chosen and well brought into apposition and "glue" sutured seems at the moment to be the method of choice in animals at least. Despite the fact that two nerve sutures interfere with regeneration more than does one suture, the time needed for recovery and the completeness of recovery is not much less than for end to end suture.[19] With homografts it makes no difference if functioning or already degenerated fresh grafts are utilized,[20] but recovery of function is always somewhat less favorable than with autografts. Heterografts give rather poor results[10,21] in comparison with homografts. Since often no fresh homografts are available, various methods for preparing preserved grafts have been tested with satisfactory results, which in the case of nerves stored in cold Ringer solution (2C. up to twenty-

one days) were even better than with fresh grafts.[19] Transplantation of formalized nerves is promising, although the results are not quite so good as with fresh homografts.[15, 22, 23] Alcohol preservation seems less favorable.[19] Results with frozen-dried nerves, rehydrated in water vapor before use, are encouraging.[24]

DENERVATION ATROPHY OF MUSCLE

The time elapsed before the outgrowing nerve fibers reach their final peripheral destination is, for otherwise comparable conditions, proportional to the distance of the peripheral area from the site of injury. The longer the peripheral stump, the longer will be the time before recovery of function starts and also the longer the time until recovery is completed. For re-establishment of sensory function, it is of astonishing little influence if the time needed for nerve fiber outgrowth is short or long. However, for the recovery of function of a denervated muscle, its distance from the site of injury becomes of greatest importance. The shorter the time between denervation and re-innervation, the more complete will be the terminal recovery of motor function. This is due to the fact that from the moment of denervation, the muscle atrophies progressively until re-innervation is established. The more marked the atrophy of a muscle, the smaller is its capacity for functional recovery. Denervation atrophy is the most progressive and the most severe type of all muscular atrophies. But for an initial period, in rats for about fourteen days, in man probably much longer, denervation atrophy has in common with other types of atrophy (due to spinal cord lesions, a cast or tenotomy) the same speed of weight loss, the same constancy of muscle power per weight unit when directly stimulated, the absence of changes in submicroscopical structure, and the presence of certain changes in metabolism.[25, 26, 27, 28, 29, 30] Only after this initial period do the more degenerative changes which are absent in the other atrophy types become clearly apparent in denervated muscle, and the denervation atrophy progresses further with time.[25, 30, 31] Even in the initial stage, degeneration atrophy can be discriminated from the other atrophies by the presence of fibrillation[32, 33] which can be detected in man a few days after nerve injury by electrical methods.[34] These fibrillations originate from foci in single fibers and spread through them towards both ends, but never cross to adjacent fibers.[35, 36] With re-innervation, fibrillation disappears quickly and the muscle returns slowly to normal metabolism, while the recovery of weight and strength is a much slower process.

CHEMICAL THERAPY

Since fibrillation characterizes denervation atrophy even in early stages, and since some investigators[28] still believe that denervation atrophy is caused by overwork through this fibrillation, the influence of drugs upon fibrillation has been carefully studied.[37, 38] Most authors found that drugs abolishing fibrillation, do not alter distinctly the course of atrophy.[39, 40] Attempts to shorten the duration of paralysis by facilitation with cholinergic drugs had surprisingly beneficial effects in the hands of one investigator,[41] but could not be confirmed.[42] A considerable inhibition of denervation atrophy in rats and monkeys, as judged by the weight loss of the muscles, was claimed for atropine in large doses by one group of investigators.[43, 44] However, it was demonstrated later on, that this apparent retardation of weight loss of the denervated muscles of the atropine-treated animals is not inhibition of atrophy, but an inanition effect which diminishes the weight difference between denervated and normal contralateral control muscle. If the denervated muscle of a treated animal is compared with the denervated muscle of a normal animal, it becomes obvious that atropine has no beneficial effect.[45, 46, 47]

Since vitamin E deficient rats develop a typical muscular dystrophy, alpha tocopherol therapy was tried on rats and on guinea pigs with denervation atrophy, but without any significant beneficial result.[48] However, the interesting observation was made that the denervated muscles of vitamin E deficient rats, thirty-five days after crushing the nerve, are functionally superior when directly stimulated than are their non-denervated contralateral control muscles. This finding corresponds to the earlier observation that in young rats, nerve section protects the muscle from vitamin E deficiency dystrophy, probably due to the absence of nerve impulses.[49] Other vitamins were tested, not so much on account of a probable effect upon the muscle, but in the expectation of hastening the rate of outgrowth of the nerve fibers. For this reason probably, thiamin and B complex have been added to the glue employed in "glue" suture.[14] But no beneficial influence was found for thiamin or yeast upon nerve

growth in tissue culture[50] or upon nerve regeneration in rats.[51] The increase of the rate of nerve fiber growth in tissue culture by Biotin[52] could not be confirmed.[53] In rats, only an insignificant acceleration of nerve fiber regeneration[51] and no influence upon the terminal recovery[54] has been reported after Biotin treatment.

Not only the stimulation of nerve regeneration, but also its inhibition is of practical importance, since in absence of regeneration, neuroma formation and development of strong adhesions do not occur under aseptic conditions. In rabbits, regeneration and thus neuroma formation could be prevented by subepineural or intraneural injection of 0.1 to 0.2 ml. of a twenty per cent formaldehyde and one per cent gentian violet solution.[55]

PHYSICAL THERAPY

The use of animal experimentation on a statistical scale has long been neglected in deciding physico-therapeutic questions. Since nerve regeneration and functional recovery of the muscle are processes showing much individual variation in the time needed for re-innervation and in the completeness of terminal recovery, experiments on two or even five animals are of little value, especially since with no method can very striking beneficial effects be expected, for various biological reasons. Only for electrotherapy has a fair amount of valuable, statistically sound, data accumulated in the last four years, all demonstrating that electrotherapy can delay not only disuse-atrophy, but can also retard denervation atrophy and hasten the functional return in re-innervated muscle.[56, 57, 58, 59, 60, 61, 62] All these studies indicate that electrical treatment is valuable only, if the stimuli employed are in strength and duration optimal in regard to the excitability of the paralyzed or recovering muscles, so that short strong tetanic contractions are produced. That means, for instance, that for a muscle with advanced denervation atrophy, short series of galvanic stimuli or short alternating current stimulations of very low frequency should be used. The frequency of the alternating current, or the time a single galvanic shock lasts, the velocity with which the latter reaches its maximal strength, and the duration of the intervals between the galvanic shocks in the series, must be adjusted for each muscle in such a way that a minimum of electrical energy is employed in producing maximal tetanic contraction. In each treatment only 5 to 10 contractions of not more than five seconds duration, with rest periods of ten to thirty seconds between, should be produced to avoid damaging fatigue. The treatment must be frequent, at least once daily. These rules, which in no way are contradicted by physico-therapeutic experience in man, and which have been recommended recently by some experienced therapists,[63, 64, 65] are not yet generally observed in treatment. This might be due partly to the fact that the commonly used electrical treatment machines do not allow such a meticulous individual adjustment of the currents.

In one study with a limited number of monkeys, the beneficial effect of massage and passive movement therapy upon the functional recovery of denervated muscle has been demonstrated.[66] A primary rest period (splint) of four weeks gave, in these experiments, uniformly better recovery. In studies with a large number of rats and statistical evaluation, casts had no effect on the rate of denervation atrophy, but definitely retarded the progress of recovery after re-innervation.[60] Exercise of the rats in a revolving cage did not affect atrophy or recovery.[62]

SUMMARY AND CONCLUSIONS

The animal experimental studies of the last years have given us valuable knowledge of new methods for nerve suture and for bridging nerve gaps, which are now well enough advanced to be tried clinically. All attempts to influence beneficially denervation and regeneration of nerve, or atrophy and functional recovery of muscle, by drugs or diets have been failures up to now. The general value and the rules which should govern electro-therapy of denervated muscle have been well established, but these basic rules are not yet generally observed in practice. Immobilization of paralyzed limbs should be used only with care and only temporarily. Concerning massage and passive movement therapy, animal experimentation has not yet contributed much. In the future, the most efficient methods of these types of treatment should be worked out in animal studies. Such work has the advantage over clinical studies, in that identical nerve lesions can be produced, that a better uniformity of treatment can be maintained, and that a large number of comparable data is accumulated much more quickly, which permits strictly statistical evaluation. Certainly, confirmation by clinical tests, of the methods worked

out on animals will be necessary. But, according to all our knowledge, the fundamental processes occurring in denervation and recovery of the motor functions are about the same in all species, and only the various time factors involved vary to a considerable extent.

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THE OLD AND THE NEW
The Egyptian Building (1845) in the foreground and the new hospital in the background symbolize the blending of tradition with modern science.

A CASE OF MORVAN'S TYPE OF SYRINGOMYELIA*

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and
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Although frequently recognized in large neurological clinics,[1] syringomyelia is a rare malady to the average physician. The classical syndrome of Morvan's type of syringomyelia is a young individual with beginning pain about the shoulders and arms, followed by loss of pain and temperature sensation, with retention of the sense of touch and later developing trophic changes of the bony structures. Painless indolent ulcers of the fingers and hands are common.

There are many types of syringomyelia and, in a broad sense, the term includes amyotrophic lateral sclerosis, spinal muscular atrophies, spinal tumor forms, and the Morvan type. This type is less often seen and therefore is considered unusual enough to be described.

CASE REPORT

This 49 year old colored female was admitted to St. Philip Hospital in October, 1942. She had enjoyed excellent health up to six years ago, when she developed a severe infection of her right hand and arm. This was followed by a chronic swelling of the hand and arm, with stiffness of the fingers. In a period of four years the left hand and arm also became swollen; both hands and wrists increased in size, with gradual stiffness and flexion of the fingers in the right hand. These structures were not particularly painful, but the patient noticed that she would frequently burn or cut her hands and not be aware of the injury. These wounds would heal very slowly and she was conscious of numbness and tingling in both upper extremities, with occasional vague pains in the wrists or fingers. There was some disability of the right hand, on account of the flexion deformity, but no definite motor weakness or muscle twitchings. The patient denied venereal infection and both her history and those of the family were irrelevant.

Physical Examination. The patient was an obese, intelligent, colored female, complaining of some stiffness of her hands. The pupils reacted normally, the retinal structures were negative, there were no cranial nerve palsies. The eyes, ears, nose, and throat were normal. The chest wall was normal but the spine showed marked scoliosis to the left, with some dorsal kyphosis and moderate lordosis in the lumbar region. The lungs and heart were not unusual, the blood pressure 130/80. The abdomen was obese and distended, but no masses were palpated. The pelvic and rectal examinations were negative. The hands and wrists were huge and deformed by swelling. The fingers were sausage-shaped and sev-

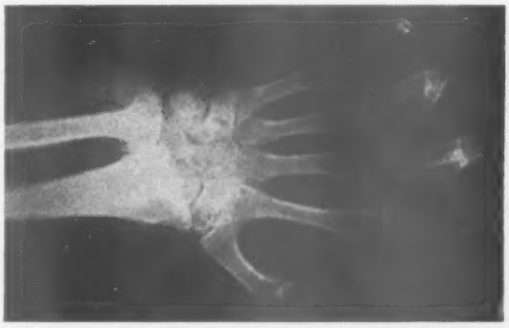

Fig. 1. Roentgenogram of the left hand, showing disorganization fractures of the wrist and a tendency towards clawing, with slight erosion of terminal phalanges.

eral indolent ulcers were present on the dorsum of the fingers in the right hand, which was held in a flexed, stiffened state. Both wrists were unusually mobile and crepitant but were not tender or painful on motion. The lower extremities did not show any changes. The neurological examination did not reveal any cranial deformities. The biceps and triceps reflexes were absent. All other deep and superficial reflexes were normal. There were no pathological reflexes. The vibratory sense was intact throughout the body, and position sense was normal. There was no atrophy, muscular weakness, or fibrillary twitchings about the body. Pain and temperature sensations were lost in both hands and wrists. There was diminution of pain and temperature sense

*Read at the Richmond Academy of Medicine, October 12, 1943.

above the wrist and on the trunk to the level of the twelfth dorsal nerve segment. Below this segment, pain and temperature senations were normal. Light touch and tactile sensation was not altered over any part of the body.

Laboratory Findings. The urine was negative for sugar and albumin and the microscopic examination was normal. The hemoglobin was 86 per cent (Sahli), erythrocytes 4,330,000, white cell count 12,150, with 71 polymorphonuclear neutrophils and 29 lymphocytes. The blood sugar was 104 mg. and the non-protein nitrogen 30 mg. per 100 cc of blood. The Wassermann and Kline tests were negative. The spinal fluid was clear and under a normal pressure and there was no evidence of a spinal fluid block. The fluid contained 30 white blood cells, 10 polymorphonuclear neutrophils and 20 lymphocytes. The spinal fluid Wassermann was negative. The sedimentation rate was normal and a 1-10,000 tuberculin skin test was normal.

Fig. 2. Roentgenogram of chest, showing dorsal scoliosis with convexity of spine to the right and fracture of the left third rib posteriorly.

Roentgen Findings. Spine: A dorsal scoliosis with convexity to the right and slight lumbar scoliosis with rotation of vertebral bodies. The left third rib posteriorly was fractured. Hands: There is disorganization, with old fractures, of both wrists, and a tendency towards "claw" hands, slight erosion of terminal phalanges and marked soft tissue swelling.

The clinical course in the hospital was not unusual. The patient was given large doses of thiamin hydrochloride and deep x-ray therapy was instituted and was continued after the patient left the hospital. She has been followed at the out-patient clinic and seems to have improved, as the ulcers on her hands are disappearing and there is less numbness about the upper trunk and extremities.

Fig. 3. The hands, with typical sausage-shaped fingers and fleshy swelling.

DISCUSSION

The bone and joint changes in our case are described as "Charcot joints". Mandeville,[2] discusses in detail the significance of joint changes in Morvan's disease. The gist of his discussion is that many roentgenologists and clinicians assume that when "Charcot joints" are diagnosed, it signifies syphilitic disease of the bone. This certainly is fallacious, because Charcot in 1868 described these bony changes as being present in other conditions besides syphilis. It has been demonstrated that direct injuries to the spinal cord, as in stab wounds, myelitis, spina bifida, and other cord lesions, may produce the same type of arthropathy described as a "Charcot joint".[3,4] This confusion in diagnosis could not be present in our case, because the bony

changes were bilateral and in the upper extremities, and the blood and spinal fluid Wassermanns were negative. Usually in Morvan's type of syringomyelia, loss of tactile sense may occur, but in our case tactile sensation was preserved, probably because the tactile fibers in the posterior column had not been involved in the disease process.

Dyke and Davidoff [5] review the roentgen treatment in syringomyelia and conclude that a certain number of cases do improve. They report improvement in seven cases, and Gurevitch et al.[6] report on 137 cases, with 70 per cent improving by deep x-ray therapy. It is obvious that there is a necessity for differentiating between late syphilis and syringomyelia, because it would be useless to treat these cases with antiluetic therapy rather than giving them the benefit of deep x-ray therapy.

SUMMARY

This is a presentation of Morvan's type of syringomyelia. It is obvious that the disease is not difficult to recognize if the cutaneous sensory phenomena are present. We would like to emphasize again the necessity of carefully evaluating all cases of "Charcot joints", as very often they are probably due to syringomyelia rather than syphilis.

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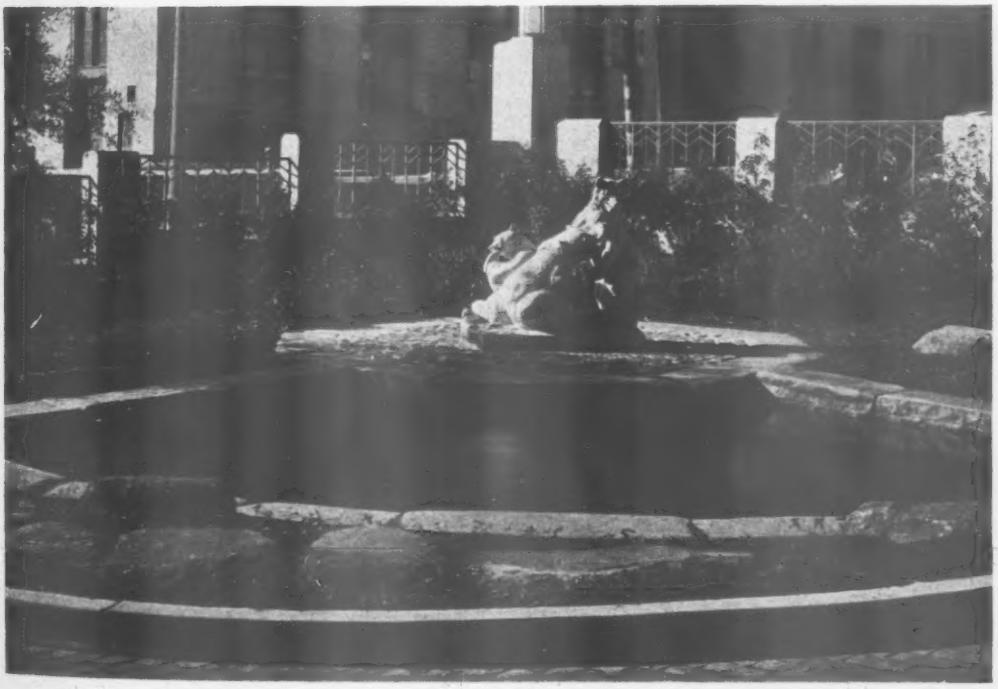

THREE BEARS
These symbols of the Indian Medicine Man play in front of the Hospital entrance.

STRUCTURE AND FUNCTION OF THE MAMMALIAN CEREBRAL CORTEX AT THE TIME OF BIRTH

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THE PROBLEM

The time of birth is the most decisive moment in a mammal's life history, representing the passage from one form of existence to an entirely different one, namely from protection to independence, or from being attached to another living being to becoming an individual. Although the embryo is well prepared and well equipped to meet the requirements of its new condition, and although it may display at earlier stages of its development numerous functional *elements* needed for extra-uterine life, there will still be the new and enormous task to carry on this extra-uterine life *as a whole* and to endure under the new conditions. In spite of the impressive results yielded by the experimental study of prenatal functions in recent years, no anticipation of fragments of post natal activities can give a true picture of what an animal has to face and what it really has to accomplish at the very moment of birth. To learn the structure of the brain of a new-born mammal will thus be a problem of fundamental importance to any scientist or physician trying to correlate structure with function.

THE CORTICAL STRUCTURE OF THE NEW-BORN MAMMAL

As early as in the third month of intra-uterine life the prodromal stage of the cerebral cortex* begins to appear in the human embryo, the so-called cortical layer (His) or lamina granularis primaria (M. Rose). It is composed of neuroblasts which have migrated from the periventricular regions of their origin towards the outer surface of the embryonic brain wall. The new layer is separated from the outer surface by a small (marginal) layer, poor in cells, which will be the first or molecular layer of the definite cortex. A new step in cortical development is made as soon as the so-called tectogenetic and fundamental type of the mammalian cortex is reached and this takes place between the sixth and the eighth month of the intra-uterine life in the human embryo. About this time, two light, broad zones appear, one above, the other below the central zone of the cortical layer, due to a looser arrangement of cells in those zones. This is already the six layer type of the definite cortex, the central, dark zone foreshadowing the fourth layer (lamina granularis interna); the lighter zone above, the third layer (pyramidal layer); and that below, the fifth layer (lamina ganglionaris); the second (lamina granularis externa) and sixth layers (lamina multiformis) being what remains of the originally unstratified cortical layer.

In an adult individual, however, the cerebral cortex will not show this same cyto-architecture at all of its regions. The fundamental six layer type will undergo what are called regional variations. The most outstanding variations concern the number of the layers of the cortex. In what is generally called the motor cortex (area 4, Brodmann; area FA, Economo-Koskinas), the fourth layer (lamina granularis interna) is lacking in the adult brain. The transformation of nearly all of the cells of this area into pyramidal cells and the appearance of unusually large cells in the fifth (ganglionic) layer are additional criteria of this cortical type ("pyramidization"). In the visual cortex (area 17, Brodmann; area OC, Economo-Koskinas) of the adult individual, the fourth layer will either be unusually broad or divided into sublayers, separated from one another by a lighter zone poor in cells (stria Gennari), the density and smallness of nearly all of the constituent elements of this cortex being other criteria of this type (Koniokortex).

We have but a very incomplete knowledge as yet as to the time at which the various cortical areas reach their definite regional characters. Roughly speaking, most of the regions of the cortex of the human new-born show already their definite cyto-architecture.[5] Therefore, those three decisive steps in cortical development (formation of the cortical layer, of the tectogenetic and fundamental type, and finally that of regional variations) are made during intra-uterine life in the human species.

*In this study the term cortex is used as synonymous with the term neo-cortex, i.e., that part of the cortex which is the most characteristic and the most extensive of the mammalian forebrain.

But a mammal can be born at any of those three decisive moments of cortical development. As has been shown by me in previous publications,[1] the bear is born with an unstratified cortical layer (fig. 1), thus recalling very early stages of cortical development of the human embryo. In the new-born rat, this cortical layer is just undergoing its first stratification. At the time of birth the cortex of the rat shows indeed the six layer type of the mammalian cortex to a large extent (fig. 2), although the medial, frontal and occipital regions of the hemisphere are not yet participating in this lamination. It seems, that the suprastriatal regions in which the fundamental tectogenic cortical type begins first to appear, are very actively growing and differentiating regions, since in the same regions, the cortical layer can be distinguished first at an earlier stage of development.

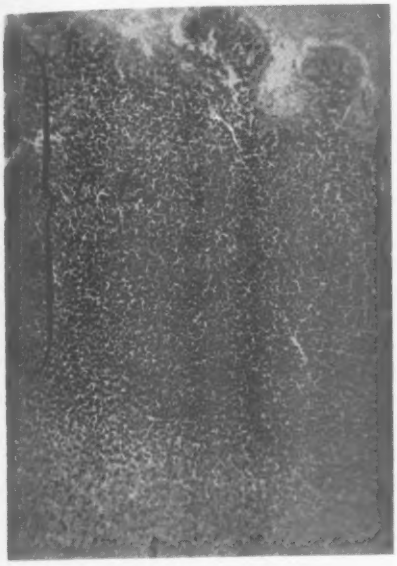

Fig. 1. H.-E. x 100.
Unstratified cortical layer (C.L.) of the new-born bear.

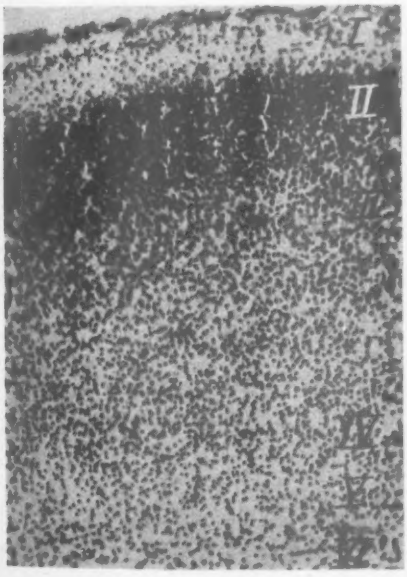

Fig. 2. H.-E. x 210.
Six layer cortex of the new-born rat.

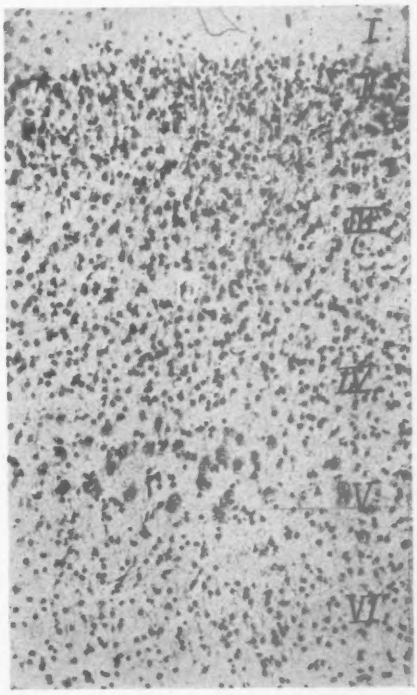

Fig. 3. H.-E. x 200.
Motor area (area 4 Brodmann) of the new-born cat.

Finally, in the new-born cat, the neo-cortex has not only reached its fundamental six layer type, but it reveals also the regional variations so characteristic of the mammalian cortex. However, the structure of the individual cells constituting the various layers of this cortex is still embryonic in character. Therefore, those regional variations based on the structure of the individual cell of the adult brain, such as pyramidization and granularization (Koniokortex),

are not recognizable as yet in the cortex of the new-born cat. The criteria of the motor cortex* in the new-born cat (fig. 3) are its thickness, its large molecular layer and the giant cells of Betz in the ganglionic layer. According to my investigations this area is still granular, i.e. it has its fourth layer (lamina granularis interna), in the new-born cat. The visual cortex of the cat at the time of birth (fig. 4) is already characterized by the density of

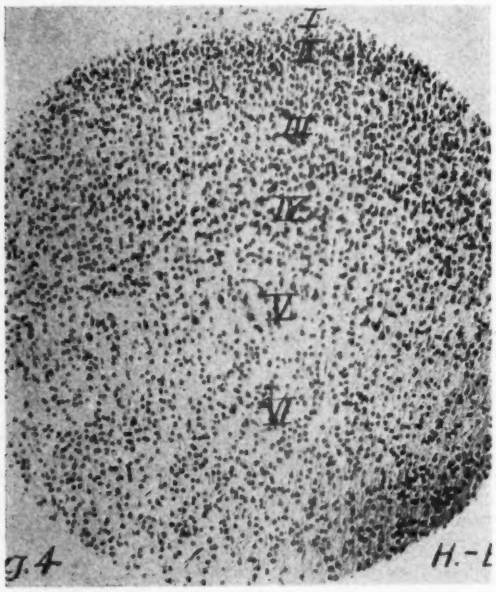

Fig. 4. H.-E. x 200.
Area striata (area 17 Brodmann) of the new-born cat.

its cell elements and the thickness of the fourth layer, the latter, however, admitting of no sublamination.

INTERPRETATION IN THE LIGHT OF THE NATURAL SYSTEM OF MAMMALS

In comparative neurology, brain forms are described and classified according to the well-known classification of the various orders to which a given brain belongs. We may thus distinguish a Primates brain, a Carnivora brain, a Rodentia brain, an Ungulata brain, a Chiroptera brain, a Cetacea brain, etc. Although peculiarities of brain structures are encountered in each of these groups, and although a given group (Cetacea), when living under conditions foreign to the whole class (Mammalia) may reveal structural arrangements of its brain recalling those of another class living exclusively under those conditions (so-called "convergences"),[4] we will not give up our classification of brain forms according to the zoological order to which each type belongs. But according to my investigations this principle breaks down when considering the mammalian cortex *at the time of birth*. One can hardly imagine a greater difference than that between the cerebral cortex of the new-born bear and that of the new-born cat. Both, however, belong to the same order, namely to the Carnivora; the bear being born with an extremely immature cortical structure, and the cat having already its typical six layer mammalian cortex with regional variations. Further investigations will have to show if the same holds true for other mammalian orders. A cursory study of the cortex of the new-born guinea-pig reveals a much more advanced stage in cortical development than that we encountered in the new-born rat. Both those species, however, belong to the same order of Rodentia. The result of our cyto-architectural studies is in conformity with that of the morphological studies of the brain surface of new-born mammals. We know that the pallium of the bear is still smooth at the time of birth, whereas that of the cat shows already its definite convolutional pattern at the same moment (Anthony,—quoted from Riese[1]). From all of these observations the conclusion can be drawn that *the mammalian cortex at the time of birth is not a characteristic proper to an order, but rather proper to a species.*

INTERPRETATION IN THE LIGHT OF TIME

At first approach one would expect that a considerable amount of time would be necessary for the formation of a highly organized cortical structure, less time being required for the formation of a primitive cortex. However, such an immature cortex as that of the new-born bear needs 207 days of gestation, the somewhat more advanced cortex of the new-born rat only 20 days, and the relatively highly organized cortex of the new-born cat, 63 days. (The

*Langworthy[2] delimited several sub-areas in the motor cortex of the new-born cat. The cortex here described is most similar to his area B. But as to the structure of the individual cell, it is certainly more immature. I attribute this difference in maturity to the fact that Langworthy's specimen was 22 hours old, whereas my specimen was only half a day old (its crown-rump length was 130 mm., its body weight 117.5 grams, the ordinary crown-rump length of kittens at the time of birth being 150 mm.). That a relatively insignificant difference in age may determine a marked difference in cellular structure in new-born mammals, especially in those born with a very immature brain, had been shown by my studies of the cortical cells in new-born bears[3], one and three days old.

human infant is born with a still more developed cerebral cortex[5]; it needs 280 days for its formation). This leads to the conclusion that *the degree of maturity the mammalian cortex may reach at the time of birth in various species is not in proportion to the time of gestation.* Furthermore, one would perhaps be inclined to correlate the developmental stage of the cortex and the rapidity with which a given cortical structure is reached in a given species, with the length of infancy this species has to expect. The latter, however, being unknown (with exception of man and perhaps the anthropoids), we can only use the length of life. So that at the time of birth the most immature cortex should be encountered in a species in which the duration of life will be rather long, thus giving to the individual a long opportunity of post natal maturation. To a certain degree this holds true for the bear, the duration of life of which is about 19 years. But the duration of life of the rat is only 2 to 3 years, while that of the cat, which has the most ripened cortical structure of our series, is only about 13 years. This leads to the conclusion that *the degree of maturity which the mammalian cortex attains at the time of birth in various species is not in proportion to the life span of the species.*

INTERPRETATION IN THE LIGHT OF FUNCTION

No extra-uterine existence is possible without the actualization of the vital functions, such as respiration, independent circulation, thermoregulation, metabolism, secretion, digestion, excretion, sucking, swallowing, alternate rhythm of sleep and waking, etc. It is generally believed that these functions require only lower levels of the central nervous system.* But a dog deprived of its spinal cord may not only survive (provided the spinal segments necessary for respiration are spared), but it also regains its thermoregulation and an arterial pressure near to normal values.[6] These facts** strongly indicate that for the accomplishment of vegetative functions the integrity of peripheral (and sympathetic) structures may be sufficient. Motion and sensation are the two elementary and fundamental functions related to the central nervous system. There is no doubt that *motion and locomotion* exist in a new-born mammal; as a matter of fact, they exist already at a much earlier stage of development. Besides righting reactions and postural tonus, the outstanding motor and locomotor pattern in a new-born mammal is what Tilney called the crawling-approach reaction,[7] comprising side to side movements of the head, alternate movements of the fore-limbs and synchronous (propelling) movements of the hind limbs as its essential elements. I saw this reaction in the new-born bear, the cortex of which is definitely embryonic in character. Langworthy[8] saw it even in the "new-born" opossum, the central nervous system of which is probably still more immature. Sensation can only be judged by the reaction an animal shows to stimulation. The new-born mammals here considered have their eyes closed and thus visual stimuli can not be effective. There is no definite evidence that touch, hearing, or smell provoke reactions. Sucking, however, presupposes some oral sensibility. There is a definite reaction to pain, the new-born mammals uttering plaintive cries and performing definite motor reactions on compression of the tail. It seems to me that *the cry of the new-born mammal* is one of its most impressive behaviors. The cry is often intense, becoming more vigorous with every hour, but it has a tone entirely different from the cries of later, especially adult stages. According to my observations the cries uttered by very different species at the time of birth may even be very similar to one another. Brown-Sequard[9] was not convinced that the existence of cries prove that there is a perception of pain, unless it is admitted that the medulla oblongata is also a center for these perceptions; he observed cries to cease only after removal of the medulla oblongata in cats, rabbits, and guinea-pigs. Although in some instances, crying may well be a pure reflex action (due to the contraction of the expiratory muscles and that of the tensor muscles of the glottis), it seems to me difficult to deny that crying is indicative of a perception of pain in those

*Brown-Sequard[9] found that even after the ablation of both the brain and the cerebellum, new-born rabbits are able to suck very well; "which is a proof that sucking may be executed by reflex action".

**Similar experiments had been made many years ago by F. Goltz. But again, I must quote Brown-Sequard[9]. He was the first one to destroy successfully the spinal cord and to keep the animals alive. His experiments have been completely forgotten. Nevertheless, they are of particular interest being performed in *young* animals the age of which was known. Brown-Sequard observed urinary secretion after complete destruction of the spinal cord from the eleventh or twelfth costal vertebra to its termination in a nearly three months old cat, thus proving that urinary secretion is not under the dependence of the spinal cord. Concerning the influence of the spinal cord on the functions of organic life, his observations are still unique, showing that not only thermoregulation but also growth, nutritive reparation, secretion of hair and nails appeared to exist without any apparent disturbance.

instances in which there is an intense and immediate crying on painful stimulation, or an increase in intensity of cries already uttered spontaneously, particularly when associated with other (motor) reactions. Goltz[10] did not hesitate to interpret the various utterances of mammals deprived of their brains as definite manifestations of corresponding sensations and feelings. I am therefore convinced that *there is sensation of pain in the new-born mammal,* although this sensation may differ in nature from what is called protopathic sensibility in an adult animal.

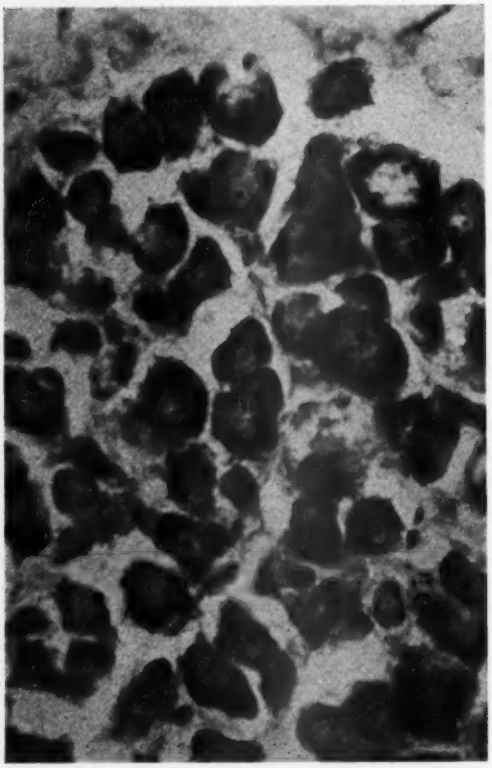

Fig. 5. Nissl x 865.
Spinal ganglion of the new-born rat.

It results from our investigations that *motion and sensation such as are seen in a new-born mammal are not in proportion to the degree of maturity the cortex shows in different species at the time of birth.* This holds true particularly for the "crawling approach reaction" which seems to be a locomotor behavior, common to various (perhaps to all) mammalian species regardless of the developmental stage their cortex has reached at the time of birth. But the problem is whether the immature cortex participates or not in those motor and sensory functions. Here our statements can only be hypothetical in character. It is generally admitted that initiating, controlling, guiding, individualization and refinement of voluntary movements are the cortical elements of motion in an adult individual. It would hardly be possible to detect them in the motor behavior of a new-born mammal. From a review of previous investigations dealing with the electrical stimulation of the cortex of new-born dogs, cats, and guinea-pigs I draw the conclusion that, generally speaking, in these species *the cortex is already a functioning motor organ but that its stimulation does not yield the proper cortical element of motion at the time of birth.* In this respect the experiments of Michailow[11] are the most instructive ones. On electrical stimulation of various points of the cortex of new-born dogs, only a generalized and massive motor response could be elicited by this author, whereas stimulation of the cortex of the adult animal yields particularized, differentiated and isolated movements. The cortex of the new-born bear had never been stimulated. The most immature cortical structure ever explored electrically is that of a 23 day old pouch-young opossum, having a crown-rump length of only 33 mm.[12] Movements of the contralateral forelegs were obtained, the predominating feature being an extensor thrust of the whole leg with outspreading of the toes. At this time the cortex appears so immature as to cyto-architecture and structure of the individual cell that the author concludes: "It seems difficult to correlate the histological picture with the physiological response". Nothing is known about the excitability of the cortex of the new-born opossum and no data are available as yet as to the cortical structure of this species at the time of birth. According to the investigations of Langworthy,[2] movements of the contralateral fore-legs can be elicited in new-born cats. But refinements of movements can only be seen in adult cats; let us remember that the cortical structure of the new-born cat is relatively mature.

The part played by the cortex in sensation is concerned with those physiological processes which underlie projection and discrimination (appreciation of relationships in space, appropriate reactions to stimuli of different intensities and recognition of the

similarity in test objects of various weights and "localizing responses" were noted in fetal rats of sensation in the new-born mammals here considered can only be guessed. However, changes in so-called "localizing responses" were noted in fetal rats of different and increasing gestation age when selected cutaneous areas were systematically stimulated.[14] As the normal birth time approached, greater specificity of response in relation to cutaneous stimulation was found in (*1*) the particularized movement of the member stimulated, (*2*) the movement of local muscles under the point stimulated, (*3*) the movement of a limb so as to touch the point stimulated.

Our study is based primarily on cyto-architecture and individual cell structure. The nervous system of the new-born mammals here considered contains no nerve cells having all of the characters of mature ganglion cells. The most immature elements were found in the cerebral cortex. As a matter of fact, we have no *objective* criteria according to which a given developmental stage of the nerve cell can be considered as already functioning and *only by arbitrary decision can a level be determined in the nervous system of the new-born mammal beyond which there is no more functioning of the constituent cell units of this organ.* In the new-born rat, neither the anterior horn cells of the spinal cord, nor those of the spinal ganglia or of the ganglia of the cranial nerves, have reached their full maturity (fig. 5). Since there are no criteria of functioning of unripened nerve cells, one might believe that this nervous system is non-functional on the ground of the immaturity of all of its constituent elements. However, I would rather consider that this immature nervous system is functioning *in its entirety*, even though we know nothing about the way in which it may function—but do we have any more knowledge about the functioning of the adult nervous system? To consider it as a functioning whole rather than exclude some of its parts (such as the cortex) from functioning, fits indeed best with the principle of integration[15] according to which *each part of a living organism participates and cooperates in the vital manifestations of the whole. There can be no functionless element in a living whole.*

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PELVIC PAIN: ITS ANATOMICAL AND SURGICAL ASPECTS IN GYNECOLOGY*

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Pain is a part of a protective physiologic mechanism, and, as such, is desirable. However, at times pain may become no longer protective, and, indeed, may become destructive. Such pain more urgently demands relief. Ideally, the relief of pain would be brought about by the removal of the pain-producing factor. However, there are cases in which the cause of the pain is not known and, therefore, cannot be directly attacked. There are also cases in which the causative lesion is known but cannot be removed. Furthermore, there are cases in which the removal of the causative lesion at the periphery would violate the principle that the treatment of a condition should not be a greater hazard or cause a greater loss than the condition itself. Under certain of the above circumstances, the treatment of choice may be the interruption of the anatomical pathways over which the pain-producing impulses pass.

Pelvic pain, that is, pain in the lower abdomen, lower back and perineum, is a common complaint of women, though much of the pain distributed within this area does not have its origin in the female genital organs, and many patients with serious diseases of the female genitalia have no pelvic pain whatever. This paper is concerned only with that pain which has its origin within the female internal generative organs. It is not concerned with pain of somatic origin which may be associated with pelvic disease. It is concerned specifically with the anatomical routes over which the pain-producing impulses travel, with the areas of distribution of the referred pain, and with symptomatic relief by the surgical interruption of the painful impulses. It is not concerned, because of limitation of time, with the interesting subject of the mechanism of origin of the pain. Neither is it concerned with the medical relief of pain as opposed to its surgical relief, or with the relief of pain by the cure or removal of a lesion.

Accurate anatomical and physiologic knowledge is more than germane to this subject, yet much remains to be learned concerning the innervation of the internal female genitalia. The anatomy and physiology described in the subsequent paragraphs are believed to represent the best information available at the present time.

*Read before the annual meeting of the Medical Society of Virginia at Roanoke, October 26, 1943.

UTERUS

All of the internal genitalia are supplied by the autonomic nervous system. The sensory nerves of the uterine *body* reach the central nervous system solely by the sympathetic division of the autonomic system. The sensory fibers run from the uterus to the pelvic plexuses. The latter are situated one on each side of the rectum, cervix, and upper portion of the vagina. From the pelvic plexuses, viscero-sensory fibers pass upward to join the superior hypogastric plexus. The bundles of communication between the pelvic plexuses below, and the superior hypogastric plexus above, are sometimes called the inferior hypogastric nerves. The superior hypogastric plexus, often miscalled the presacral nerve, lies retroperitoneally in front of the fifth lumbar vertebra in the interiliac trigone. Fibers from this plexus pass upward over the aortic bifurcation to join the preaortic pelvic plexuses. Sensory fibers from the uterus, following the route described, reach the spinal cord through the posterior roots of the eleventh and twelfth thoracic segments. Though the sacral autonomics communicate with the pelvic plexuses, available evidence suggests that no sensory connection exists between the sacral nerves and the body of the uterus.

Visceral pain is believed to be referred to the areas of distribution of the somatic nerves which reach the spinal cord at the same segment or segments as do the viscero-sensory fibers from the organs involved. Accordingly, pain of uterine origin should be referred to those somatic areas supplied by the eleventh and twelfth thoracic nerves. Therefore, the pain would be referred anteriorly to the lower abdominal wall (fig. 1) and posteriorly to the lower lumbar region (fig. 4), inasmuch as the

dermatomes of the eleventh and twelfth thoracic nerves are so located.

If pain is not relieved by the removal at the periphery of the agent responsible for the pain, it can be attacked proximally in the nervous system at one of several levels. Thus, theoretically, the removal of an appropriate part of the sensory cortex would be a method of pain relief, a method most centrally applied. A lower level of intervention, and one indicated in certain cases of inoperable malignant neoplastic disease, lies in the spinal cord. Here, in the operation known as chordotomy, selective division of the spinothalamic tracts is performed at the proper level. In the case of uterine pain such a level is several segments above the eleventh and twelfth thoracic segments. This procedure is contraindicated in benign conditions, partly because of untoward effects which may result from the operation.

Another site of attack is at the posterior nerve root. The roots may be cut or may be treated by subarachnoid alcohol injection. Theoretically, the former method, in the case of uterine pain, would be applied to the eleventh and twelfth thoracic roots and would seem indicated only in inoperable malignant disease, if at all. Valid objections to it are the coincident somatic effects and its occasional failure to give relief. Subarachnoid alcoholic injection is a simple procedure aimed at affecting the less protected pain fibers in the posterior roots. This procedure is best limited to cases of hopeless malignant disease, because of the danger of serious untoward results.

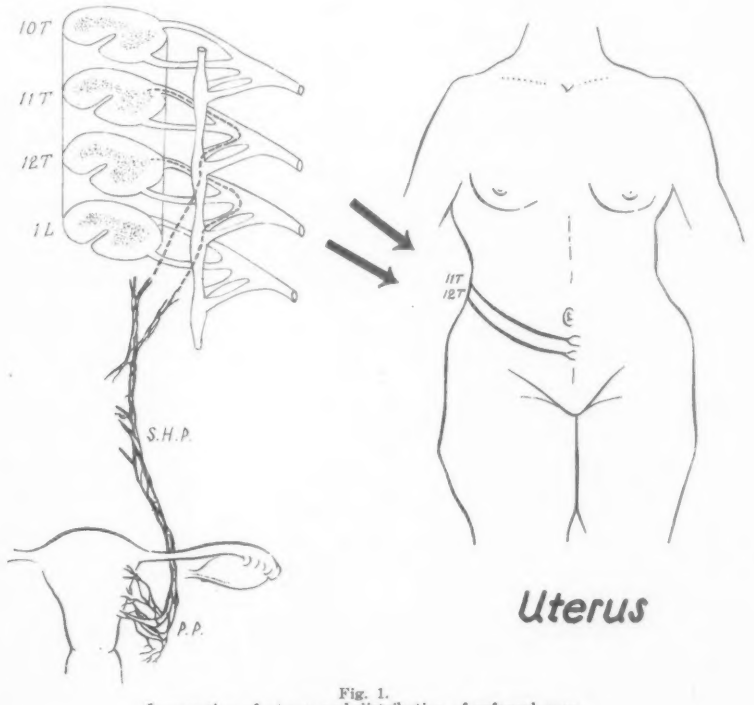

Fig. 1.
Innervation of uterus and distribution of referred pain.
P. P. = Pelvic Plexus.
S. H. P. = Superior Hypogastric Plexus.

The above procedures have limited application. They are best performed by the neurosurgeon. An attack at the level of the autonomic nervous system is the most practicable and desirable surgical method of relieving uterine pain, and it falls within the spheres of the properly trained gynecologist and general surgeon. The operation par excellence, in the case of uterine pain, is the resection of the superior hypogastric plexus. In this structure there is concentrated into an accessible area all of the sensory fibers of the uterine body. Furthermore, the opera-

tion is almost always successful in properly selected cases, and there seem to be no untoward effects. The chief indication for this operation is primary uterine dysmenorrhea. The risk in trained hands is no greater, and probably less, than that of an average major abdominal operation.

Alcoholic injection of the pelvic plexuses per vaginam for the relief of dysmenorrhea has been performed with a reported cure rate of fifty per cent. Because of the apparent uncertainty of the results and the risk of undesirable injuries, this blind procedure does not appeal to this writer, inexperienced in its use.

Temporary relief from uterine pain can be brought about by spinal anesthesia or by caudal injection. The latter, in the form of a continuous anesthesia, is now being publicized for use in labor cases especially. In such procedures the anesthetic must reach the level of the eleventh and twelfth thoracic segments to block pain impulses from the uterine body.

CERVIX

There is evidence to show that the sensory innervation of the cervix is at least in part through the sacral parasympathetics. Pain on the stretching of the cervix during childbirth after superior hypogastric plexus resection has been recorded. The writer has noted repeatedly that the cervix retains pain-sensitivity after the same operation. It follows that therapy aimed at the neurosurgical relief of cervical pain must be in part directed at the sacral parasympathetics, or at the pelvic plexuses which receive the parasympathetics, or be directed more centrally, as within the spinal canal. Interference with the superior hypogastric plexus alone would not suffice.

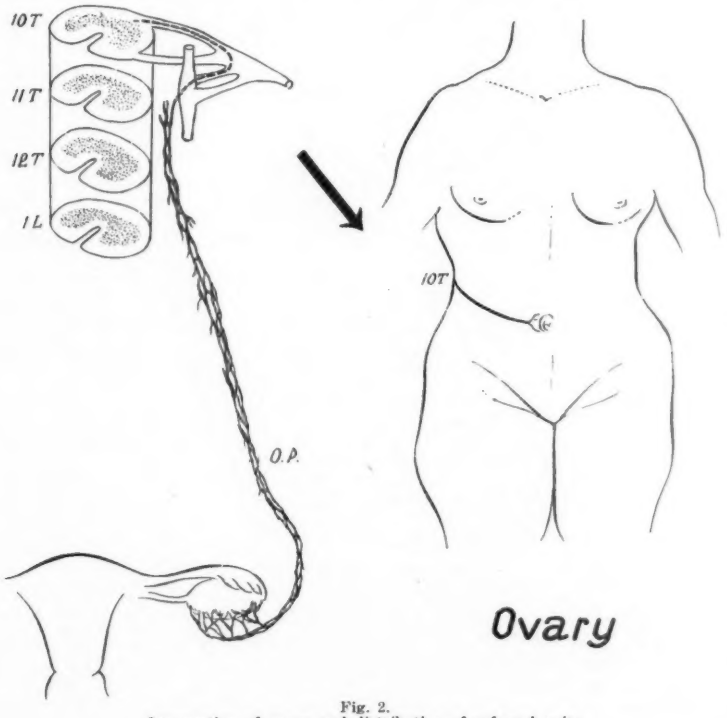

Fig. 2.
Innervation of ovary and distribution of referred pain.
O. P. = Ovarian Plexus.

OVARY

Sensory fibers from the ovaries do not pass through the superior hypogastric plexus. They pass upward along the ovarian vessels to levels at least above the inferior mesenteric and lower preaortic plexuses, and enter the spinal cord at the level of the tenth thoracic segment. Thus, theoretically, ovarian pain referred to the abdomen would be at the level of the umbilicus (fig. 2).

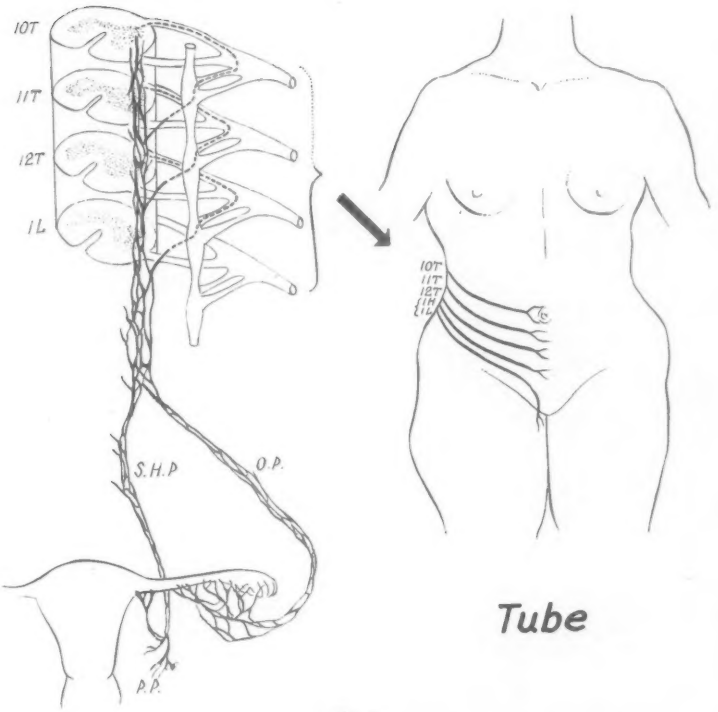

Fig. 3.
Innervation of Fallopian tube and area of distribution of referred pain.
P. P. = Pelvic Plexus.
S. H. P. = Superior Hypogastric Plexus.
O. P. = Ovarian Plexus.

The relief of ovarian pain could be brought about by procedures similar to those described in the discussion of the uterus. The most notable exception, however, is that resection of the superior hypogastric plexus would not affect ovarian pain. However, ovarian pain could be abolished by the resection of the ovarian plexus as it courses along the ovarian vessels. This operation has been performed, but in ovarian disease the indication for sympathectomy is not so clear as in the case of uterine pain, and there is some danger of injury to the ovarian blood supply with resulting undesirable effects on ovarian function. At the present time there seems to be little place for this operation.

UTERINE TUBES

The uterine tubes have a dual sensory supply. The portion of the tube nearest the uterus sends fibers through the superior hypogastric plexus. The remainder and larger portion sends fibers along the ovarian plexus. These sensory fibers are believed to reach the spinal cord at the eleventh and twelfth

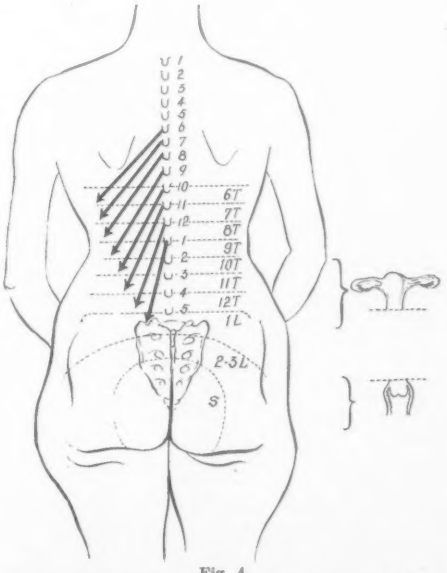

Fig. 4.
Diagrammatic representation of marked descent of sensory nerves from spine to skin, showing separate areas of distribution of referred back pain from tubes, ovaries, body of uterus, and from cervix.

thoracic, the first lumbar, and possibly the tenth thoracic levels. Referred pain would be within an area representing the sum of the areas of uterine and ovarian pain plus the areas covered by the distribution of the first lumbar nerve (figs. 3 and 4). The neurosurgical relief of tubal pain would seem rarely, if ever, indicated. If such relief is indicated, the statements made in the preceding sections on the uterus and ovaries would apply with appropriate and obvious modifications.

The external genitalia are not included in this discussion.

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When Thou Examinest a Woman

Who has lived many years without her menstruation having appeared; she vomits something like foam and her body is as though a fire were under it, but she recovers after the vomiting; then say thou to her: This is a rising of blood to the womb. So soon as she has spoken the Magic Formula, and has had coitus, make thou for her:

Berry-of-the-uan-tree	1/32
Caraway	1/64
Incense	1/64
Uah-grain	1/16

Put cow's milk to the fire with thigh-tallow. Add milk thereto and let her take for four days.

Remedy to Allow the Womb of a Woman to Slip Into Its Place:

The-film-of-dampness-which-is-found-on-the-wood-of-ships

Rub in yeast-of-fermented-beer and let her drink it.

ANOTHER:

Put an ibis-of-wax on the coals and allow the fumes thereof to penetrate into her sex-organs.

ANOTHER:

Oil-of-the-earth (petroleum?) with peddu (manure)

Keep in honey and rub the body of a woman therewith.

The Papyrus Ebers, 1500 B.C.

ANENCEPHALY WITH ANTENATAL ROENTGEN DIAGNOSIS IN THREE CASES

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According to Broder,[1] anencephaly, a not infrequent malformation of the nervous system, is characterized by the absence of both cerebral hemispheres and usually a dark red mass of vascular tissue replaces the calvarium. In April, 1916, Hartung,[2] in discussing congenital anomalies and variations of the bony skeleton as revealed by the x-ray, said, "we have diagnosed one case of anencephalus in this way." Case,[3] in September, 1916, reported a case of anencephaly successfully diagnosed before birth and pointed out that, "the rounded shape of the head is conspicuously absent; even in plates which show distinctly the spinal bones, the bones of the base of the skull, and the face." He had apparently thoroughly reviewed American, British, German, French, Central European and Scandinavian literature in 38 references included in his published paper, without finding cases with antenatal roentgen diagnosis of anencephaly preceding his. Since 1916, the literature mentioned above, plus Italian, Russian, Chinese, Indian, Japanese, South and Central American, and African papers contain scattered reports of anencephaly, many not readily available for review. Accessible roentgen reports have been made by Beath,[4] Case,[3] Case and Cooper,[4] Doub,[5] Grunspan-De Brancas,[6] Harris,[7] Hartung,[2] Hunter,[8] Jennings,[9] Maier,[10] Matthews,[11] Spangler,[12] Stevens,[13] Tracy,[14] Yamaguchi,[15] and others.

The pathology of the endocrine glands associated with anencephaly has been discussed especially by Angevine,[16] Barlow,[17] Broder,[1] Browne,[18] and Chin.[19] The more recent anatomic and embryologic aspects have been studied by Bean,[20] Bloom,[21] Buxbaum and Wachsman,[22] Harbeson,[23] Josephson and Waller,[24] Lloyd,[25] Marcus and Nickman,[26] Nanagas,[27] Stockard,[28] Stroer and van der Zwan,[29] Thompson,[30] Thoms,[31] and Von Recklinghausen.[32]

Throughout the literature there seems to be general agreement that whenever hydramnios is suspected clinically, a fetal monstrosity should be considered. Anencephaly is considered a monstrosity which can be diagnosed by adequate anteroposterior and lateral roentgenograms during the latter half of pregnancy.

A review of the obstetrical records at the Medical College of Virginia Hospitals for a period of ten years, 1933 to 1942, inclusive, revealed 71 cases with polyhydramnios. Of these, gross deformity of the fetus was noted in 7 (9.8 per cent). Three were fetal monstrosities, 3 had erythroblastosis of the hydrops variety, and 1 infant had clubbed feet. One of these monstrosities was diagnosed before delivery by x-ray.

Fig. 1. Case 49522. Lateral film with antenatal diagnosis of anencephaly.

During the first six months of 1943, following the above period of study, a diagnosis of anencephaly was made before delivery in 2 patients who had roentgenograms made of the abdomen because of polyhydramnios.

M. C. V. CASE No. 49522: A 33 year old white primigravida, 26 weeks pregnant, was admitted to Memorial Hospital February 18, 1938, with pregnancy complicated by toxemia and polyhydramnios. Her blood pressure was 140 systolic and 100 diastolic. The uterine fundus measured 35 centimeters above the symphysis. No fetal heart sounds were heard. X-ray examination on the day of admission showed no definite skull vault, suggesting anencephaly.

Fig. 2. Case A-18787. Anteroposterior film with antenatal Roentgen diagnosis of anencephaly.

Labor started the following day with spontaneous rupture of membranes. A stillborn anencephalic monster weighing 2 pounds 7 ounces was delivered after only twenty minutes of labor. Postpartum course was uneventful.

M. C. V. CASE No. A-18787: A 24 year old colored multipara was admitted to St. Philip Hospital on February 4, 1943, because of a uterine pregnancy of twenty-eight weeks, complicated by polyhydramnios. She was gravida 5, para 2, abortions 2. Blood pressure was 120 systolic and 70 diastolic. The uterine fundus measured 47 centimeters above the symphsis. No fetal heart sounds were heard. She complained of dyspnea and abdominal discomfort from pressure of enlarged uterus.

Fig. 3. Case A-20762. Lateral film with antenatal Roentgen diagnosis of anencephaly.

X-ray studies at the time of admission to the hospital showed a single fetus with anencephaly.

On the morning of February 6, two days after admission, a sterile vaginal examination revealed the cervix to be soft, and 3 cm. dilated. The membranes were ruptured artificially and a little over 7000 cc. of amniotic fluid was allowed to escape slowly. Eight hours later, she delivered spontaneously a stillborn anencephalic monster.

Her postpartum course was complicated by endometritis with low grade septic temperature to 101F. for five days. She was found to be a mild diabetic. Blood sugar was 122 mg. per 100 cc. on admission. At one time during the septic period, the blood sugar was as high as 244 mg.

Her convalescence was otherwise uneventful and she was discharged from the hospital on February 21, 1943.

M. C. V. CASE NO. A-20762: A 36 year old white multipara was admitted to Medical College Hospital on March 16, 1943, because of a uterine pregnancy, near term, complicated by polyhydramnios. She was gravida 4, para 3, abortions 0. Her estimated date of confinement was March 17, 1943. The prenatal course had been uneventful. Hemoglobin was 60 per cent. Blood pressure was normal. The uterine fundus measured 33 cm. above the symphysis.

X-ray examination on the day after admission showed a single anencephalic fetus. On the afternoon of admission, a sterile vaginal examination showed the cervix to be 2 to 3 cm. dilated. The membranes were ruptured artificially and approximately 3000 cc. of amniotic fluid was allowed to escape slowly.

Labor started soon thereafter and she delivered spontaneously a stillborn anencephalic fetus after five hours of labor. Her postpartum course was uneventful.

SUMMARY AND CONCLUSIONS

The ante-partum diagnosis of anencephaly by x-ray in three cases has been reported.

Routine roentgen examination of the abdomen in all cases of polyhydramnios is advisable.

If a monstrosity is found, it is best to keep the mother in ignorance of the fact and interrupt the pregnancy. The mother can be spared a long pregnancy and futile expectancy of a normal child.

The small quantity of roentgen radiation necessary for the examination, less than 1/50 of an erythemal dose, according to Tracy,[14] is not considered dangerous for mother or fetus. Our own measurements with a Victoreen instrument showed 5r in the anteroposterior exposure and 8.5r in the lateral exposure, as measured on the skin, a total quantity of 13.5r.

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DORMITORY, CLINIC, AND HOSPITAL.

CHRONIC OSTEOMYELITIS OF THE PETROUS PYRAMID WITH EXTENSIVE EXTRADURAL ABSCESS AND SPONTANEOUS DECOMPRESSION*

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Clinically, lesions of the petrous portion of the temporal bone are prone to occur without evidence of the cardinal symptoms and signs of a diseased petrous pyramid. Lillie and Williams[1] have pointed out that no limited and rigid symptom complex fulfills all the requirements for the establishment of a diagnosis of a petrous bone lesion. The following case report illustrates such an instance.

Prior to the 19th century, lesions of the petrous bone aroused interest, for the most part, by the description of the pathologic changes encountered at autopsy. In 1904 Grandenigo[2] presented a triad of symptoms: otorrhea, pain in the trigeminal nerve distribution and abducens nerve paralysis which stimulated interest in the clinical recognition of the lesion responsible for the syndrome. The greatest advance in the recognition and management of suppurative lesions of the petrous pyramid has been made since 1930 by the contributions of Kopetsky,[3] Almour,[3] Eagleton,[3] Lillie and Williams,[1] Ramadier,[3] Lempert,[4] and Moorehead.[5]

The temporal bone consists of the squamous, the petromastoid and the tympanic portions. There are three types of bone structure found: the pneumatized, the diploic and the sclerosed bone. Mixtures of these types may occur.

The temporal bone consists of the squamous, the more often diploic than pneumatic. The temporal bones of some adults never pneumatize and remain diploic. The petrous portion of the temporal bone is the area most prone to remain diploic. Should an infection occur in the petrous portion of the temporal bone one of two clinical entities may result: (1) petrositis or osteitis which occurs in pneumatized temporal bone, and (2) osteomyelitis which occurs in bone containing marrow.

Bast and Forester[6] studied serial sections of 39 temporal bones of 27 infants ranging from full term to 6 years, and 97 temporal bones of 69 fetuses, ranging in age from 8 weeks to term. They were unable to demonstrate air cells in the petrous apex that were not connected with other cells of the petrous bone. They concluded that there is no direct relation between air cells and bone marrow. Air cells do not invade bone marrow directly. When air cells extend into diploic bone, the cells of the bone marrow disappear, and the connective tissue becomes less dense than prior to the invasion of the air cells. When the formation of air cells is complete, the cells are separated from the bone marrow by a plate of bone or by dense connective septums.

CASE REPORT

The patient, a white married woman, aged 26 years, was admitted to the Medical College of Virginia Hospital, February 6, 1942, because of a discharging sinus of the left occipital region of seven months' duration, and headache on the left side for three years.

Three years before admission (1939), she had developed purulent otitis media on the left following an attack of acute coryza. Two weeks later, she noticed left malar pain and headache involving the left side of the head. The headache and malar pain seemed to be more severe whenever the aural discharge decreased or stopped temporarily. Although sinusitis was considered, none was demonstrated as a possible cause of the pain. Six months after the onset of the otitis media, she awoke one morning with marked vertigo which remained for approximately six weeks. The attack necessitated bed rest as she could not walk because of it. The attack of vertigo was also associated with marked left malar pain, but without diplopia, vomiting or cervical rigidity. She did not recall the degree of diminished hearing during this period because she felt that the ear discharge and cotton plug in the

*Read before the annual meeting of the Virginia Society of Ophthalmology and Otolaryngology, May 15, 1943, in Lynchburg.

ear contributed to total deafness on the diseased side.

She recovered from the attack of vertigo and was ambulatory for over two years. During this period she continued to have headache and malar pain which was definitely related to the amount of ear discharge; the less discharge, the more pain.

In March, 1941, she again developed severe vertigo requiring complete bed rest for a period of two weeks. In April, 1941, a complete mastoidectomy was performed on the left side at another hospital. Aural discharge and wound drainage had diminished at the end of six weeks. One week later or at the end of seven weeks after mastoidectomy, a painful swelling of the scalp appeared in the left occipital region. This was incised and pus was released. The purulent discharge lasted for a week. The occipital swelling recurred on cessation of the discharge. It was necessary to incise and drain the abscess that formed over the occipital region on seven occasions during the year following its onset. The headache and malar pain persisted. Tinnitus and deafness on the left side were constant, but she had no vertigo or feeling of unsteadiness.

The patient's past history was otherwise non-contributory. An attempt to determine the amount of sulfonamides taken by the patient during the three years was unsuccessful, as she did not know about this, in as much as a number of physicians had prescribed treatment.

Physical examination revealed a well nourished and very apprehensive female. The positive physical findings were limited to the head and were as follows: There was a small opening in the scalp of the left occipital region 2 mm. in diameter from which a drop of pus could be expressed. A linear vertical scar measuring 2 cm. in length on each side of the opening could be identified under old dried discharge and matted hair. A healed post-auricular mastoidectomy incision scar was present on the left side. The left tympanic membrane was thickened and showed absence of light reflex, but was intact and there was no discharge from either ear.

Audiometric studies disclosed normal hearing on the right side and total air and bone conduction deafness on the left. Tests of vestibular function resulted in a normal reaction on the right, but the left labyrinth showed no reaction to either ice water or hot water.

The remainder of the physical examination, including a study of the ocular fundi and neurologic examinations, was essentially normal.

The laboratory data on admission, February 6, 1942, including an analysis of the urine, was within normal limits. The blood Wassermann reaction for syphilis was negative.

Roentgenograms of the skull were not unusual except that the left lamboidal suture was very prominent on comparison with the right, and there was a separation between the occipital and parietal bones on the left side, about 4 mm. in width and 2.5 cm. in length (fig. 1). Films taken in the Towne posi-

Fig. 1. Roentgenogram February 6, 1942. The lambdoidal suture on the left is abnormally wide as compared with the right side. Through this hiatus, pus escaped extracranially, thus affording a valuable partial decompression of the abscess before operation.

tion, and of the base of the skull, showed some erosion of the petrous ridge of the left temporal bone around the internal auditory meatus. There was marked clouding of the cells and the cell walls were poorly defined. There was definite roentgenologic evidence of osteomyelitis of the bone in the left petrous ridge.

Course in Hospital. On admission, the oral temperature was 99 F., the pulse rate 100 per minute, respiration 24 per minute, and the blood pressure 120/70. The patient was observed for three days during which time the oral temperature did not rise above 99 F.

Operation. On February 9, 1942, the region of the draining sinus in the left occipital region was explored. The sinus tract in the scalp was excised in toto and a vertical incision was made through the scalp in line with the scar of previous operations. The incision was then extended in an elliptical manner around to the left mastoid region and extended anteriorly to expose the left temporal region. The sinus tract was found to lead between the occipital and parietal bones to granulations over the dura covering the left cerebellar hemisphere and temporal lobe.

It was necessary to remove the bone over the left cerebellar hemisphere and the sinus tract, from which pus flowed to the extent of 8 to 10 cc. Granulations 3 and 4 mm. in thickness and bathed in pus, overlay the cerebellar and parietal dura. The tract was followed down to the anterior petrous surface for 2 cm. medially. The posterior petrous ridge was inspected and sclerotic bone covered with thick granulations and pus was found. The exploration of the petrous bone was terminated when the internal auditory meatus (from which pus exuded) was located. Rubber drains were then placed down to the internal auditory meatus and to the occipital dura and brought out at various points along the scalp incision. The scalp wound was closed with interrupted sutures.

Culture of the pus removed from the extra-dural space showed the presence of Streptococcus hemolyticus. Postoperative convalescence was uneventful, and the patient was discharged at the end of two weeks. There was a small amount of discharge from the occipital wound which required daily dressings. The patient was no longer disturbed by left-sided headache or left malar pain. After her dismissal from the hospital, she was observed from time to time for a period of three months. During this period, there was a small amount of continuous drainage from the posterior wound which, when cultured at various intervals, was found to contain Streptococcus hemolyticus on one occasion, diphtheroids on a second occasion and Staphylococcus aureus in the third and fourth specimens of pus.

Roentgenograms in May, 1942, showed well advanced osteomyelitic sequestrums and sclerosis of the entire petrous bone on the left side (fig. 2).

Second Operation. On May 15, 1942, using the classical post-auricular incision for mastoidectomy, the previously operated (April, 1941) mastoid cavity was exposed. A sufficient amount of bone was then removed to allow separation of the dura from

Fig. 2. Roentgenogram May, 1942. The skull defect from the operation February 9, 1942 is readily identified. The left petrous ridge is irregular and diseased bone may be noted.

the posterior petrous surface leading to the internal auditory meatus. There was a very fibrous tract leading from the external scalp wound, at the site of our previous operation, to the internal auditory meatus. The entire outer plate of the mastoid and mastoid process and the bony posterior auditory canal were then removed. Two large and several small pieces of sclerotic sequestrated bone were carefully separated from their attachments to the soft tissues of the internal auditory canal with some difficulty. The vestibular and auditory portion of the eighth cranial nerve and the facial nerve were embedded in edematous granulation and inflammatory

tissue which extended from the porus acusticus. The semicircular canals were opened and found filled with gray inspissated pus and thickened membrane. The cochlear vestibule was found filled with liquid pus. The labyrinthectomy was completed after the manner described by Richards[7] with modifications to suit the occasion (fig. 3).

Fig. 3. Roentgenogram October 28, 1942. Five months after sequestrectomy the remaining bone is very sclerotic and the edges are smooth.

The wound was sprayed with two grams of sulphanilamide powder, flat rubber drains were placed along the dural surface to the remainder of the petrous apex and external auditory canal, and the wound was closed with interrupted sutures. The patient's condition was considered good at the completion of the operation.

Postoperative Course. Sulphadiazine was given orally postoperatively for prophylactic purposes for five days and then discontinued. At the end of eighteen hours (second operation), the patient had completely awakened from the effects of the anesthetic, and no apparent weakness of the left facial muscles was present. The first signs of facial muscle weakness on the left were evident at the end of twenty-four hours and facial paralysis on the left side was complete at the end of forty-eight hours. Except for the facial weakness, convalescence was uneventful, and she was discharged from the hospital on the twentieth post-operative day, at which time the post-auricular wound was completely healed. A small amount of drainage was evident from the region of the cochlea by way of the external canal.

The patient's progress has been followed at frequent intervals for the past eighteen months, in spite of traveling difficulties from a distant city. At present, her condition is one of excellent general health. The radical-mastoid and labyrinth cavity is epithelialized and dry except for a small granulation site where exudate and crusts accumulate so that cleansing is required at varying intervals. Headache is no longer present and residual tinnitus on the left is so slight that the patient is not disturbed by it. The facial muscle tone has shown return of function, estimated at 85 per cent or more, during this period.

SUMMARY

It is apparent that this case represents disease of the petrous pyramid without the typical signs and symptoms of petrositis as described by Gradenigo. At the time the patient was admitted to the Medical College of Virginia Hospital, there had been no discharge from the involved ear for six or seven months. There had been no lateral rectus muscle palsy at any time throughout the entire illness, and although at times she had severe left malar pain, she did not have the usual retro-ocular pain of petrositis.

An analysis of the case from its onset indicates the course of the infection was as follows: After the attack of otitis media on the left side, mastoiditis and involvement of the petrous bone developed. Concurrently an extradural abscess was probably contributing to the headache described. In support of this, we feel that it is worthwhile to call attention to a pertinent fact—namely, that whenever there appeared to be a temporary slowing up of the aural discharge, presumably due to temporary obstruction, the headache and malar pain became more pronounced. This fact would tend to suggest increased dural pressure from the extra-dural abscess. At the time of her first attack of vertigo, serous labyrinthitis must have occurred. We have no report on the state of hearing and the condition

of the static labyrinth following the attack, but the diagnosis is based on the assumption that to have the second attack of labyrinthitis two years later (there is no history of involvement of the opposite ear), the labyrinth could not have been completely destroyed by suppurative disease at the time of the first attack of vertigo.

Mastoidectomy was performed after the second attack of labyrinthitis. Upon cessation of discharge from the ear and mastoid wound, the abscess over the occiput developed. Subsequent events proved that the source of pus was the extradural abscess associated with chronic suppuration of the labyrinth and petrous pyramid. The point of least resistance for escape of the pus proved to be the lambdoidal suture, a most unusual site for spontaneous decompression of such an abscess (fig. 1). This was really a fortunate occurrence as it permitted escape of some of the pus extracranially, thus lessening the chance for possible meningo-encephalitis or brain abscess that would have occurred by extension of the pus into the subarachnoid space.

Upon removal of the extensive amount of thick granulation tissue overlying the dura and establishing adequate drainage for the pus, the headache and malar pain were completely relieved—a fact noted within the first three days following the first operation by us (February, 1942). The second operation (May, 1942) verified the diagnosis of a diseased labyrinth and osteomyelitis of the petrous pyramid, and permitted thorough eradication of the diseased bone.

The gradual delayed development of, and subsequent recovery from, the facial nerve paralysis, favor the edema theory as contributing to temporary loss of function of this nerve.

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DISCUSSION

DR. EMANUEL U. WALLERSTEIN, Richmond: Dr. Pastore has ably presented this interesting case.

It is not typical in that there was no retro-orbital or circumorbital pain which is characteristic. This serves to emphasize that in the diagnosis of petrositis we cannot rely on any one symptom.

As for roentgen examination, I believe a fair statement is that a positive x-ray does not necessarily mean operation; that is unless cavitation and demineralization are demonstrated. For in a number of cases a positive x-ray shadow is caused by congestion of the petrosal cells. The reverse is also true for, at times, a case presenting a negative x-ray may be operative.

In the localization of the lesion and consequent operative approach, a consideration of the anatomy is helpful. If we divide petrositis into two categories, viz; that anterior to the eminence of the superior semicircular canal and second, that posterior to this canal, we can be aided by the location of the discharge. I refer, of course, to those cases in which a mastoidectomy has been performed preliminary to the development or recognition of petrositis. In the anterior variety, there is usually a continuing discharge from the middle ear while in the posterior variety the middle ear is dry, but there is discharge from the mastoid wound.

Another point illustrated by this case is that there is no one surgical procedure in dealing with petrositis.

DR. FLETCHER WOODWARD, Charlottesville: Dr. Pastore is to be congratulated in the management of this case. The presence of the Staphylococcus aureus organism in any bone lesion demands the utmost respect. We are all aware of its slow, but persistent, continued presence once it gains a foothold.

EFFECT OF FOOD ON LIVER FAT OF ANIMALS FOLLOWING CARBON TETRACHLORIDE POISONING

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Opie and Alford[1] showed that animals fed a diet of oats and sugar were less susceptible to hepatic damage by chloroform poisoning than those fed either meat or fat. The latter was exceptionally bad.

Graham[2] found that dogs given glucose one hour before chloroform anesthesia, again at the end of anesthesia and on the following day showed no liver necrosis and little increase in its neutral fat content, while control animals anesthetized at the same time showed fatty livers with marked necrosis. He believed that a high glycogen content of the livers of the treated animals was responsible for their protective state. Davis and Whipple[3] obtained definite indications of protection against hepatic damage by chloroform from sucrose administration to dogs several hours prior to anesthesia. Glucose intravenously during anesthesia was of no benefit. Administration of casein or certain other foodstuffs such as kidney, brain and skim milk for several days prior to the anesthesia also was found to increase the animal's resistance. The administration of a casein digest to starved dogs shortly before anesthesia may have made the animals slightly more resistant but the effect was not at all definite. These authors in another publication[4] showed that liver regeneration following chloroform anesthesia took place more rapidly if the animals were on a high carbohydrate diet than if they were on a high protein diet. A mixed diet was probably superior to either. Moise and Smith[5] concluded a high protein diet exerted greater protection than a high carbohydrate diet, while a high fat diet was detrimental.

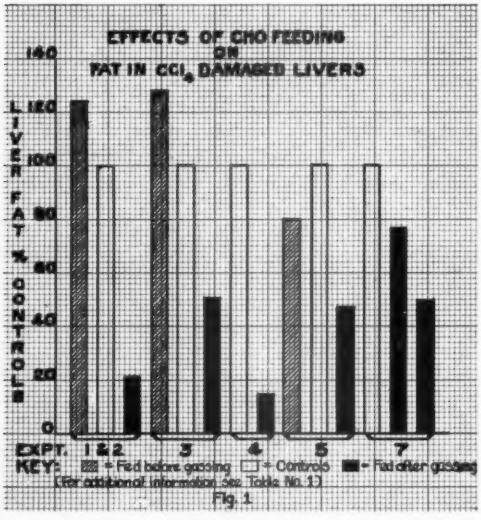
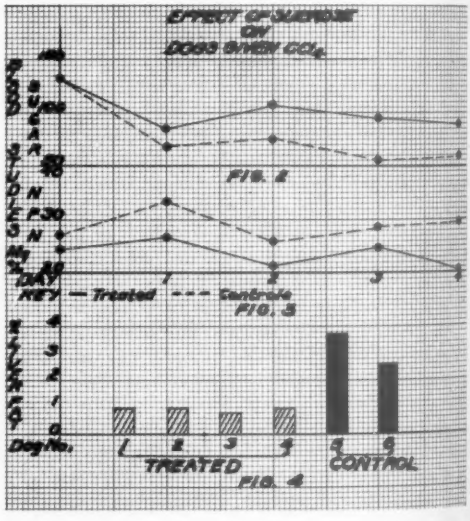


Fig. 1



Chandler and Chopra[6] found the administration of sucrose several hours before anesthesia, with carbon tetrachloride, gave liver protection in cats but not in dogs. Davis[7] found a diet of beans and rice efficacious against carbon tetrachloride poisoning. A mixed or a high protein diet was protective while a high fat diet markedly decreased the animal's resistance.

Ravdin and his associates[8, 9] showed that, contrary to the generally accepted theory, the level of

liver glycogen at the time of anesthesia was not an important factor in the prevention of liver damage from chloroform administration. They concluded that the extent of liver damage following chloroform anesthesia of unstarved rats increased with increased concentration of liver lipids. Forbes, Leach and Outhouse,[10] on the other hand, found that rats with fatty livers from a low-protein, low-choline, high-fat diet, after twenty-four hours starvation were but slightly more susceptible to carbon tetrachloride than normal rats starved for the same period of time. However, the oral administration of fat shortly before the time of anesthesia was found to decrease definitely the animal's resistance to this poison, a result in agreement with that obtained by all other investigators. Ravdin and his associates[8, 9] concluded from their experimental work that a high-protein, high-carbohydrate, low-fat diet afforded the greatest protection against chloroform. They also emphasized the importance of supplying an adequate caloric intake. Miller and Whipple[11] found that dogs depleted of their protein stores by a low protein diet or by plasmapheresis were very susceptible to chloroform. The administration of a single large meat meal about thirty-six hours before anesthesia markedly increased the animal's resistance. Bollman[12] concluded that a high-carbohydrate, moderate-protein, low-fat diet afforded the greatest degree of protection against carbon tetrachloride, as evidence by the length of life of animals receiving repeated exposures to this poison.

TABLE 1
EFFECT OF CARBOHYDRATES ON THE NEUTRAL FAT CONTENT OF THE LIVER FOLLOWING CARBON TETRACHLORIDE ADMINISTRATION

Exp. Number	Number of Rats	Average Body Wt.	Average Liver Wt.	Liver Neutral Fat + Chol.**	Supplements*
		GM.	GM.		
1-2	7	216	9.4	7.4 (6.1-10.)	Controls.
	3	225	10.4	8.6 (6.0-11.2)	50% sucrose solution 18, 15, 12, 9 hrs. and 10 min. before CCl_4.
	10	239	7.5	2.2 (0.7-3 6)	50% sucrose solution shortly after CCl_4 and at 3 hr. intervals for a total of 5 doses.
3	4	225	8.4	8.0 (8.2-9.9)	Controls.
	4	208	8.9	8.9 (5.0-13.8)	40% sucrose solution 6 and 3 hrs. and 10 min. before CCl_4.
	4	208	8.0	5.9 (2.4-10.4)	40% sucrose solution as above, again shortly after CCl_4 and at 2½ and 5 hr. intervals thereafter.
	4	198	7.5	4.0 (3.0-5.1)	40% sucrose solution shortly after CCl_4 and at 2½ and 5 hrs. thereafter.
4	4	214	6.6	8.2 (5.0-10.0)	Controls.
	3	212	5.0	1.5 (1.5-1 6)	40% glucose solution shortly after CCl_4 and at intervals of about 3 hrs. for a total of 5 doses.
5	7	139	6.8	7.9 (3.8-14.7)	Controls.
	7	137	6.8	6.2 (3.1-8.7)	40% glucose solution 6 and 3 hrs. and 10 min. before CCl_4.
	6	147	5.7	4.6 (2.2-6.9)	40% glucose solution shortly after CCl_4 and at intervals of about 3 hrs. for a total of 3 doses.
6	4	174	7,3	8.8 (8.0-9 2)	Controls.
	4	168	6.1	4.6 (3.7-5.9)	30% glucose solution shortly after CCl_4 and at 4 hr. intervals for a total of 5 doses.
	4	160	5.7	5.3 (4.2-5.9)	30% sucrose solution shortly after CCl_4 and at 4 hr. intervals for a total of 5 doses.
7	4	189	8.0	3.9 (2.2-5 8)	Controls.
	4	178	7.1	4.3 (1.7-5.2)	20% glucose solution shortly after CCl_4 and 3½ hr. intervals for a total of 5 doses.
	3	173	7.3	2.6 (2.0-3.8)	20% sucrose solution shortly after CCl_4 and 3½ hr. intervals for a total of 5 doses.

*All supplements were given at a level of 1 cc. per 100 grams of body weight.
**Liver neutral fat plus cholesterol values are given as per cent wet weight. (Range given in parenthesis.)

On account of the conflicting views still existing regarding the significance of carbohydrates and proteins in the prevention of liver damage and death from hepatic insufficiency following administration of chloroform or carbon tetrachloride, it was decided to restudy the subject in the hope that additional information could be obtained. The fact that starved animals are more susceptible to these poisons than unstarved ones is generally accepted. However, the mechanism by which starvation brings about this

decreased resistance is by no means agreed upon. If carbohydrates and proteins acted directly, then the administration of glucose or of a protein hydrolyzate to animals prior to anesthesia should increase their resistance over that of corresponding animals receiving no foodstuff. Their administration afterwards, on the other hand, though not necessarily preventing liver necrosis, might reduce the strain on that organ by preventing fat infiltration of the liver or by some other mechanism, thus enabling the liver to regenerate when otherwise the damage might progress to such an extent as to be incompatable with the animal's survival.

TABLE 2

EFFECT OF AMINO ACIDS WITH AND WITHOUT CARBOHYDRATES ON LIVER LIPIDS FOLLOWING CARBON TETRACHLORIDE ADMINISTRATION

EXP. NUMBER	NUMBER OF RATS	AVERAGE BODY WT.	AVERAGE LIVER WT.	LIVER NEUTRAL FAT + CHOL.**	SUPPLEMENTS*
		GM.	GM.		
1	4	245	9.1	6.9 (6.6-7.5)	Controls.
	4	230	8.4	6.3 (5.0-7.0)	20% amino acid solution shortly after CCl_4 and at 3 hr. intervals for a total of 5 doses.
2	3	147	6.9	10.3 (6.6-16.9)	Controls.
	3	146	7.1	5.6 (3.0-7.5)	20% amino acid solution 5½ and 3 hr. and 10 min. before CCl_4.
	3	147	6.9	8.4 (5.2-14.5)	20% amino acid solution shortly after CCl_4 and at 3 hr. intervals for a total of 3 doses.
3	4	205	6.7	8.0 (7.5-9.4)	Controls.
	4	216	5.8	2.2 (1.7-2.9)	30 gm. of glucose in 100 cc. of a 20% amino acid solution shortly after CCl_4 and at 3 hr. intervals for a total of 5 doses.
4	4	250	9.5	5.6 (1.6-8.8)	Controls.
	4	231	8.3	5.6 (4.0-6.9)	42 gm. of glucose in 100 cc. of a 20% amino solution 5 and 2½ hr. and 10 min. before CCl_4, and again shortly after CCl_4 and at 2½ and 5 hr. thereafter.
	4	237	8.4	5.2 (4.2-6.3)	Above solution shortly after CCl_4 and at 2½ hr. intervals for a total of 3 doses.
5	5	216	7.5	7.0 (3.3-11.5)	Controls.
	5	204	7.1	4.7 (3.6-5.8)	30 gm. sucrose + 20 gm. dextrin in 100 cc. of a 20% amino acid solution at 10 a.m. shortly after CCl_4 again at 1:30, 5, 7:45, 12 midnight, 8:45 next morning, 1 and 5 p.m. Animals killed at 9 a.m. next day, about 47 hr. after CCl_4.

*All supplements were given at a level of 1 cc. per 100 grams of body weight.
**Liver neutral fat plus cholesterol values are given as per cent wet weight. (Range given in parenthesis.)

EXPERIMENTAL

Food was removed from the cages of albino rats of approximately the same age, size and sex. Some were then given food as indicated in the tables, while others received none. All were anesthetized with carbon tetrachloride approximately twenty-four hours after the food was removed. The method of anesthesia has been previously described.[13] The animals were killed by decapitation approximately twenty-four hours after anesthesia, their livers were removed and a portion taken for histological examination. Approximately one-half of each lobule was ground together in a mortar, after which samples were taken and these were analyzed for neutral fat and cholesterol. The analytical procedures used have been described previously.[14] Typical analytical results are shown in Tables 1 and 2, and in Figure 1. Cholesterol values are not included as they were all approximately normal, averaging 0.3 gm. per 100 grams of wet liver tissue.

A somewhat similar experiment was carried out on dogs. The same general results were obtained. Six dogs which were on Purina dog chow for at least a week, were starved for twenty-four hours and injected subcutaneously with 0.5 cc. of carbon tetrachloride per kilogram of body weight. Shortly after the carbon tetrachloride administration four of the animals were given by stomach tube, 10 cc. per kilogram, of a 20 per cent sucrose solution. This was repeated every four hours for the next four days. Blood glucose, N.P.N. and total plasma fatty acids were determined at intervals throughout the experiment. The values for glucose and N.P.N. are graphically presented in Figures 2 and 3. The blood for these analyses was removed just prior to

the administration of sucrose to the treated animals. The values for total plasma fatty acids are not included as they showed no definite difference between the treated and control animals. As a whole, the control animals showed the lower fatty acid level but the difference was too small to be considered significant. The animals were killed at the end of the four-day period, their livers removed and analyzed for neutral fat and cholesterol as well as histologically examined. The analytical results are graphically presented in Figure 4. Studies similar to those on the rat were carried out on 20 rabbits using chloroform as the anesthetic agent, the same general results being obtained.

DISCUSSION

It will be seen from the results presented that the administration of carbohydrates in sufficient quantity and at frequent intervals following carbon tetrachloride administration, prevented any marked increase in liver fat. On the other hand, the administration of carbohydrates prior to the administration of the carbon tetrachloride exerted no inhibiting effect upon the fatty infiltration of the liver. In the rat, five doses of 4 to 5 grams of either sucrose or glucose per kilogram of body weight over an approximately twelve-hour period following the anesthesia were usually sufficient to keep the liver neutral-fat content down to approximately a normal value. Three similar doses over a six-hour period, though exerting a definite effect, allowed considerable fatty infiltration of the liver. A somewhat similar response was obtained from five doses of 2 grams per kilogram of body weight over an approximately twelve-hour period. Five doses of 3 grams per kilogram at four-hour intervals following anesthesia also were not sufficient to prevent a definite rise in the neutral fat content of the liver. In the dog, however, the administration of 2 grams of sucrose per kilogram of body weight every four hours for a four-day period was sufficient to give a normal neutral-fat content of the liver at the end of that time, while that of the controls was definitely increased. Amino acids, when administered at a level of 2 grams per kilogram of body weight for five doses at three-hour intervals, exerted no demonstrable effect. However, a combination of amino acids and carbohydrates was satisfactory. The negative effect of the amino acids by themselves was probably due to our inability to supply them in amounts sufficient to meet the animal's caloric requirement.

It would appear justifiable to conclude from these results that if fatty infiltration of a damaged liver is to be prevented, it is necessary to supply the animal with an adequate caloric intake. This, in the rat, would appear to be in the neighborhood of 80 calories per kilogram of body weight per twenty-four hours. The importance of supplying a sufficient caloric intake to patients with liver disease has been emphasized especially by Ravdin.[9]

The degree of liver necrosis noted in the livers of the rats killed twenty-four hours after anesthesia was roughly the same in both controls and treated animals, irrespective of whether the supplements were given before or after anesthesia or both before and after anesthesia. However, when the supplements were continued over a two-day period after anesthesia and the animals then killed, the livers of the treated rats, on the whole, showed less necrosis than those of the controls. No difference in the degree of necrosis was noted between those given carbohydrates, or carbohydrates plus amino acids. The dogs given sucrose over a four-day period following carbon tetrachloride administration, showed less liver damage than the control animals which received no food during that period. Although the administration of an adequate caloric intake of carbohydrates, or of carbohydrates plus amino acids does not materially reduce the degree of liver necrosis resulting from anesthesia with carbon tetrachloride or chloroform, nevertheless, it seems logical to assume that administration of these foods, through inhibiting fatty infiltration, increases the liver's chance of regeneration and the consequent survival of the animal.

This investigation unfortunately throws no light on the reason why starved animals are more susceptible to chloroform or carbon tetrachloride than animals fed a normal diet. The results which we have obtained from the administration of amino acids or of carbohydrates prior to anesthesia, indicate that these foods are not responsible *per se* for the increased resistance of well-fed animals to these toxic agents. It would appear that if one is considering how best to prevent death from exposure to these poisons, two factors must be considered: first, how to decrease the amount of liver damage which will result from exposure to a definite amount

of these poisons; and second, how to reduce the strain on the damaged organ so as to give the animal a better chance for recovery. The first can be accomplished to a considerable extent by the administration of certain sulfa-drugs,[15, 16, 17, 18] by subcutaneous injections of such material as xanthine, india ink or sodium ricinoleate,[19, 20, 21, 22, 23, 24, 25, 26] or by preventing starvation by means of a low fat diet. The present investigation indicates that recovery from liver damage can be favorably influenced by the administration of an adequate amount of carbohydrates so as to keep fatty infiltration of the liver to a minimum. Administration of calcium, as shown by the experimental work of various authors,[27, 28, 29] also favorably influences the animal's chance of recovery from acute carbon tetrachloride and chloroform poisoning.

SUMMARY

The administration of large amounts of either glucose or sucrose *prior* to anesthesia with carbon tetrachloride, exerted no inhibitory effect on the development of fatty livers in experimental animals. However, their administration in sufficient amounts *after* anesthesia greatly reduced or completely inhibited this fatty infiltration. The degree of liver necrosis evident at the end of twenty-four hours after anesthesia was, on the whole, not affected by the various supplements employed. However, when these supplements were continued for two days or longer, the treated animals showed less liver necrosis than the corresponding controls. It is suggested that carbohydrate administration, through inhibition of fatty infiltration of the liver, may enable that organ to regenerate when otherwise this would not be possible.

The amino acid solution used was kindly supplied by Frederick Stearns and Company, Detroit, Michigan.

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GINGIVAL HYPERPLASIA ASSOCIATED WITH DIPHENYL-HYDANTOIN THERAPY

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Since 1938, when Merritt and Putnam[1] introduced diphenylhydantoin sodium for the treatment of epilepsy, this drug has been widely used as an anti-convulsant. Certain toxic reactions have been observed following its administration.[2] Among these are chronic gastritis and hyperplasia of the gingivae. The purpose of this article is to describe two cases of severe gingival hyperplasia associated with dilantin sodium therapy.

The incidence of gingival reactions in patients receiving dilantin has been reported as low as 3 per cent[3] and as high as 62 per cent.[4] Lately Stern, Eisenbud and Klatell[5] recorded changes in over half of 50 patients followed for a period of two years. They pointed out that the incidence and degree of pathologic change increase with a longer period of medication and intimated that early conservative estimates should be regarded with caution.

The earliest signs of gingival reaction to dilantin are minute, and recognizable only to a trained observer. They are more qualitative than quantitative in nature and consist of a progressive, granular, warty change in the appearance of the gingival surface. The average reaction is mild and severe changes are seldom observed. The severe reaction is characterized by a massive hyperplasia of the interproximal papillae that may include the gingival festoons. This overgrowth of tissue may cover most of the clinical crowns of the teeth.

The mechanism by which the dilantin causes changes in the gingivae is still obscure, as is the immunity and susceptibility exhibited by patients. No direct correlation with diminution of salivary output, impairment of local resistance, or any dietary deficiency could be demonstrated.

Three methods of treatment may be resorted to: (1) conservative periodontal treatment, (2) surgical removal of the hyperplastic tissue, (3) withdrawal of the drug. A partial resolution of the gingival overgrowth usually occurs when dilantin is discontinued. However, gingival hypertrophy alone does not seem to justify a substitute.

The first case observed was that of a male of 18 years of age. He had been treated for epilepsy since early childhood. Three years ago, dilantin was substituted in part for phenobarbital. Changes in the gingivae were noticed by the patient during the past year. They progressed rapidly. Treatment was requested due to the unpleasing appearance of the overgrowth of tissue. The changes were so severe that the entire clinical crown of some of the molar teeth was covered by gingivae (fig. 1). Figure 2 reveals the appearance of the teeth two months after the hyperplastic mass had been excised.

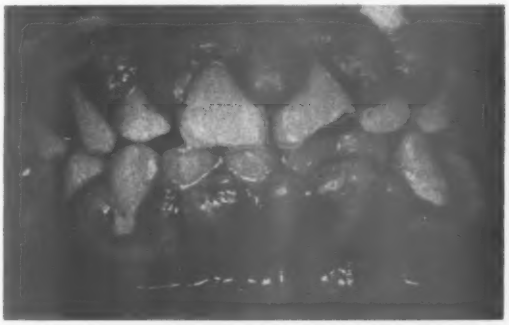

Fig. 1. Hyperplastic gingivae of 18 year old male treated with dilatin-sodium.

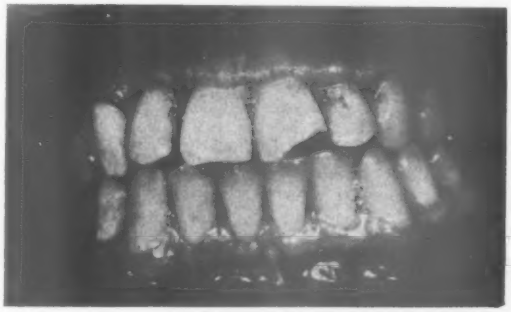

Fig. 2. The same case seen in Fig. 1 two months after surgical removal of the hyperplastic gingivae.

The second case of severe gingival hyperplasia was observed in a girl, 11 years of age, who was being treated with dilantin for spastic disorders. The overgrowth was so extensive that it resulted

in impaired function during mastication. The clinical crowns of the teeth were almost covered by the gingivae (fig. 3). The general physical condition

Fig. 3. Hyperplastic gingivae of 11 year old girl treated with dilantin-sodium.

of this patient was so poor that no treatment was given.

The hyperplastic tissue in these cases was firm in texture and exhibited little evidence of inflammation. The surface was nodular and well epithelialized. No evidence of hemorrhage was observed nor was there any change in color.

A section was made of tissue taken from the gingivae in the anterior part of the mouth of the first patient (fig. 4). The epithelium is thicker and more hornified than normal. There is a marked increase in the amount of subepithelial connective tissue and collagen. An exudate, composed chiefly of round cells, is present in the connective tissue. This exudate was no more predominant than is usually seen in normal gingivae.

The histologic picture shows that changes in the subepithelial connective tissue are mostly responsible for the gingival overgrowth. Differential diagnosis should be made with other generalized hyperplastic changes of the gingivae in mind, notably those presumably caused by endocrine disturbances in young patients. In these individuals the hyperplasia is less apparent and the patient's history rules out the dilantin relationship.

When the classic picture of dilantin hyperplasia is altered by the presence of local irritating factors such as poor mouth hygiene with accumulation of calculus about the teeth, the gingivae are swollen, red, tender and bleed readily. In these cases the gingival changes resemble those found in blood dyscrasias and the presence of leukemia is a possibility that should not be overlooked.

As a general rule all methods of treatment give favorable results, if the patient is cooperative and keeps oral hygiene at a high level. Gingival hypertrophy alone appears insufficient to warrant discontinuing the use of dilantin, providing it is of benefit to the patient's general condition. The choice between surgical removal of the diseased gingivae and local treatment should be based on the psychic reaction of the patient to the disfigurement, his general condition from the standpoint of sur-

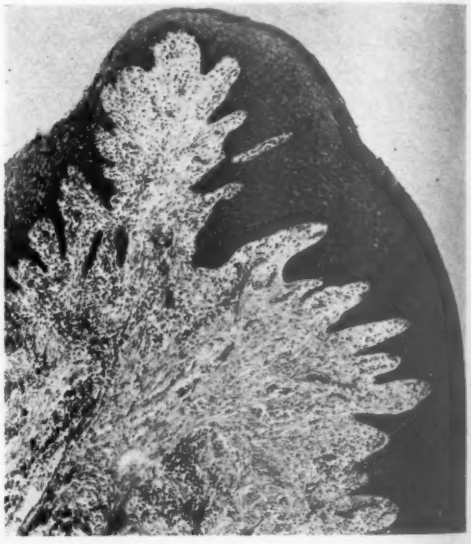

Fig. 4. Photomicrograph of section of tissue taken from gingivae seen in Fig. 1.

gical risk, and his willingness to cooperate in the treatment. Successful local treatment is largely dependent on the patient's ability to follow directions for home care of the teeth. It is indicated in the milder type of reaction and in patients that are of a relatively normal intelligence level.

Surgical treatment is more rapid and gives satisfactory results in cases with severe changes. The esthetic result is pleasing and there is little tendency for recurrence providing the patient practices rigid home care. In those individuals of an intelligence level that precludes reasonable personal attention to the condition of the gingivae, surgical treatment is of value when the overgrowth is so severe that it

interferes with function. In such instances the relief is of temporary value.

SUMMARY

1. Gingival hyperplasia associated with dilantin sodium therapy has been discussed.

2. Two cases have been reported.

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MEDICAL COLLEGE OF VIRGINIA CAMPUS.
Hospital, upper left center, State Capitol, lower right.

THE COUNCIL
MEDICAL SOCIETY OF VIRGINIA

The Council of the Society met on January 27, 1944, in Richmond, with the President, Dr. C. B. Bowyer, presiding. Others present were: Dr. H. B. Mulholland, president-elect; Dr. N. G. Wilson, vice-president; Drs. F. C. Pratt, J. L. Rawls, W. B. Porter, J. L. Hamner, W. C. Akers, J. J. Giesen, A. F. Robertson, Jr., Percy Harris, and F. H. Smith, councilors, Dr. M. P. Rucker, editor; Dr. I. C. Riggin, State Health Commissioner; Drs. W. C. Caudill, W. B. Blanton, and E. P. Lehman, chairmen of committees, and several members of the Legislative Committee and others interested in the Society's legislative affairs.

Following lunch, Dr. Bowyer called the meeting to order and asked for action on the minutes of the last Council meeting. These were approved as printed in the MONTHLY (pages 624-5, December, 1943).

He said that cards had been sent the councilors several weeks ago, asking them to indicate date they preferred for next meeting of the Society, as it was necessary to make arrangements with the hotel promptly in order to secure a date in October. In accordance with the wishes of the larger number, dates for the 1944 meeting in Richmond had been set as October 23, 24, and 25. These were approved by the Council.

The President then appointed Drs. Rawls and Porter as the Budget Committee to prepare and present a budget at the annual meeting of the Council.

Dr. Bowyer said the Secretary had advised that the financial condition of the Society is such that she felt more bonds could be purchased in addition to the seventeen bought in December. For patriotic reasons (the 4th War Loan drive being on) and as an investment, motion was offered that the Secretary invest sufficient of the Society's funds in the F Series bonds to make $2,000.00 at maturity. This was approved and carried.

Dr. Lehman, chairman of the Cancer Committee, spoke of the work of the Virginia Cancer Foundation. He said that Virginia is one of ten states having no cancer law. The Foundation had prepared a bill to present the Legislature, but the Governor felt there was no chance of passing it this year as it called for an appropriation. The Foundation did not wish to push it in view of the Governor's feeling in the matter, but decided that, through the Society's legislative chairman, they would present a resolution to the General Assembly for a study program for cancer control in Virginia, that it may be considered by the Legislative Advisory Council. Motion was made to approve Dr. Lehman's action and was carried.

Dr. Emmett, chairman of the Committee on Public Relations and Medical Service, was not present, but Drs. Mulholland and Riggin stated that the committee had met to discuss several matters. Dr. Riggin said that one matter under consideration by this committee was the rehabilitation of men turned down by the army. The Rehabilitation Division of the State Board of Education had money for this purpose and the committee felt it a worthy cause—one which should have careful consideration, especially as they wish the backing of the medical profession. Unless there was objection, Dr. Bowyer said he would have Mr. Johnson of this Board speak to the Council later.

Dr. Blanton, chairman of the Committee to Study the Coroner Situation, said he was not as optimistic as he had been, but he was not discouraged. The Legislative Advisory Council had turned his committee report over to a subcommittee headed by Senator Battle. The Committee had been unanimous in its opinion that the plan is a good one but felt the General Assembly would not adopt it at this session on account of the appropriation required. Dr. Blanton said the committee thought it might be well to get their bill introduced this year, even if they could not secure the appropriation and that they might change the bill to provide that no one now holding a coroner's position should be put out of office. After discussion, motion was adopted that the Council approve the action of the committee to go ahead with its plans.

Dr. Caudill, chairman of the Legislative Committee, told of the three bills presented by the chiropractors and naturopaths for separate boards and also the bill presented by the Society to amend the Medical Practice Act. He then presented the following resolution with regard to the bills now before the General Assembly and asked the pleasure of the Council with regard to it:

WHEREAS, the General Assembly has before it House Bills 5 and 7 creating separate examining boards for Chiropractors and Naturopaths, and House Bill 6 creating a so-called basic science examining board dominated by members of these two groups, which bills also contain provisions admitting to practice without examination and regardless of competency nearly all chiropractors and naturopaths now in Virginia; and

WHEREAS, the board created by House Bill 6 is wholly incompetent to examine candidates on the basic science subjects, these subjects never having been capably taught or seriously studied in any Chiropractic or Naturopathic school, and the weakness of this board makes the plan of regulation proposed by the Campbell Commission and contained in these bills a travesty on medical licensure; and

WHEREAS, the General Assembly likewise has before it for consideration House Bill 29, sponsored by the Medical Society of Virginia and the State Medical Examining Board, which requires applicants in every branch of practice to pass a basic science examination given by the medical members of the present examining board, with candidates known only by numbers to insure impartial grading, and with a second examination adapted to the school of practice of the applicant, a Chiropractor and a Naturopath being added to the board to examine and grade the applicants in these fields of practice; and

WHEREAS, it is the considered opinion of this Council that the passage of the Campbell Commission bills will break down the high medical standards established through sixty years of effort on the part of our profession, and that the revision of the Practice Act in House Bill 29 presents a fair and impartial regulatory plan which will safeguard the health and general welfare of the citizens of our State; now therefore,

BE IT RESOLVED by the Council of the Medical Society of Virginia in meeting assembled at Richmond, this 27th day of January, 1944, speaking for the more than two thousand members of the profession on the Society's rolls, that the Medical Society of Virginia hereby earnestly requests the members of the Senate and the House of Delegates of Virginia to defeat House Bills 5, 6 and 7 proposed by the Campbell Commission, and to enact into law the revision of the present Medical Practice Act contained in House Bill 29.

Dr. Mulholland moved its adoption. Dr. Bowyer then asked each doctor present to express his views on this matter, following which Dr. Rawls moved adoption of the resolution with the recommendation that a copy of it be put on the desk of each senator and delegate in the General Assembly. Carried.

Dr. Bowyer next presented Mr. Anderson and Mr. Johnson of the Rehabilitation Division of the State Board of Education that they might explain the plans they had with regard to rehabilitation of the physically impaired. They stated that the Board had been interested in rehabilitation work since 1920 and, with Federal aid now promised, they are able to expand this service for those unable to pay their own way. They do not wish to set up any plan not understood or approved by the medical profession and the Board wishes their advice. They presented a pamphlet on Physical Restoration in Vocational Rehabilitation and explain that vocational counseling is the crux of the work and vocational adjustment must be set up early. They will need doctors to sit down and go over details with them, and would like an advisory committee (perhaps three men) who will assist them in formulating a workable program. They stated that in Virginia last year, 1,278 defects were corrected and these people secured employment. Their work is with non-service people and they have headquarters in Richmond, though it is their aim to serve people as near their homes as possible. Dr. Bowyer said the Society would be glad to work with the Board as fast as possible. In the meantime, they may contact the councilors in any emergency and they will assist until some definite plan may be worked out. A motion was then offered that the committee be composed of the present committee on Public Relations and Medical Service, augmented by two men from Richmond, and be known as the Rehabilitation Committee, the President to name the two men. Carried.

The President presented a letter from the American Medical Association in regard to having the State Societies contact component societies and set up organizations to work for the 4th War Loan. It was felt that each man would take what bonds he could but that it was now too late to contact the societies and have them organize for this. The letter was ordered filed.

Dr. Mulholland said the Committee on Public Relations and Medical Service had held two meetings and at these the subject of medical care had caused much discussion. The Governor wished to know about the cost of medical care and Dr. Riggin had secured for him fees and all available information. The Governor feels that medical care is a problem of the State and that any proposal for medical care should have the backing of the Medical Society of Virginia. He agreed to appoint a commission to study medical care and the distribution of doctors in cooperation with the medical profession. After discussion, the following resolution was offered and adopted:

That the Council of the Medical Society of Virginia approve the proposed plan to appoint a legislative commission for the study of medical care in Virginia, and it would suggest that the Council be given the privilege of advising with the Governor and this Commission from time to time on this important subject, and

It is further respectfully requested that two members of the Commission be members of the Medical Society of Virginia, as recommended by the Council of the said Society.

Dr. Mulholland said he had received a letter from Powers and Anderson, with reference to the proposed 3 per cent sales tax on all retail sales. They had asked him to present this matter to the Council and have the doctors take action through their Legislative Committee to have health supplies, including drugs, medical equipment and supplies, sold to physicians, dentists or hospitals be considered a wholesale transaction, or, if possible, to have these items entirely exempted by name from tax. Motion was made that this letter be turned over to the Legislative Committee with the approval of the Council and that all possible medical supplies be omitted from taxation. Carried.

Dr. Smith said that the Legislative Advisory Council had recommended streamlining all boards and someone had suggested that the State Board of Medical Examiners be cut to five members. Neither he nor Dr. Preston felt that the Board could function satisfactorily if reduced to this number and he thought it would be well for the Legislative Committee to keep this in mind. A motion was then made and adopted that the Council is opposed to any streamlining of this Board and if the Legislative Committee hears of any activity in this line, they get to work to oppose it.

Adjournment followed.

AGNES V. EDWARDS,
Secretary.

Approved:
C. B. BOWYER,
President.

February 12, 1944.

CASE REPORT OF MATERNAL DEATH

MATERNAL HEALTH COMMITTEE
MEDICAL SOCIETY OF VIRGINIA

The patient was a thirty-eight year old colored woman who had had ten previous pregnancies. She first visited a physician during the fourth month of her pregnancy and did not consult him again until the eighth month. No information is available regarding the findings at the time of the first visit. At the second visit when eight months pregnant she was referred to a hospital where she was admitted two days later.

The history obtained at the time of admission to the hospital revealed that there had been considerable nausea and vomiting throughout the entire pregnancy. One month before admission she had become dyspneic and had to be propped up on pillows to enable her to rest. She coughed frequently, particularly at night.

Examination at the time of admission revealed a somewhat obese colored female about eight months pregnant, who had to sit up in order to breathe comfortably. Blood pressure 200/140, temperature 99.8, pulse 120, and respirations 32. There were a few moist rales in both lung bases. There was moderate edema of the lower extremities. The optic fundi showed a vascular sclerosis, which was thought to be an acute process superimposed on a chronic hypertensive disease. Laboratory examinations showed a red blood count of 3,760,000, hemoglobin 76 per cent, and white blood count 9,600. The urine showed four plus albumin and a few granular casts. An electrocardiogram showed evidence of myocardial damage. The Wassermann was negative. She was treated by digitalization and restricted fluids. Five days after admission she was much improved, although later in the day she started vomiting and complained of epigastric pain. She continued to vomit, blood pressure 230/152, and clinical jaundice was noted. During the entire day there was only 50 cc. of dark, highly concentrated urine excreted. She went into spontaneous labor and delivered a macerated stillborn infant spontaneously. Following the delivery she seemed temporarily improved, but then became worse again and died thirteen hours postpartum.

COMMENT

A review of this patient's record indicates that this individual should have avoided pregnancy, as she undoubtedly had a hypertensive cardio-vascular disease. After pregnancy did occur she should have sought medical attention and advice in the second or third month of the pregnancy, at which time the pregnancy should have been terminated and future pregnancies prevented probably by a sterilization operation on the Fallopian tubes. Both of these procedures could have been carried out at the same time by abdominal hysterotomy and tubal ligation. Even when seen by her physician in the fourth month it would seem that the above course should have been followed. When cardiac failure appeared at the eighth month of pregnancy, the course followed and the treatment prescribed seems to have been that generally accepted as correct at the present time.

A doctor should have a falcon's eye, a girl's hand, and a lion's heart.—DUTCH PROVERB.

A doctor gets less work from six men than from one woman.—SPANISH PROVERB.

PUBLIC HEALTH

I. C. RIGGIN, M.D.
State Health Commissioner of Virginia

The report of the Bureau of Communicable Diseases of the State Department of Health for January, 1944, compared with the same month in 1943, follows:

	January 1944	January 1943
Typhoid and Paratyphoid Fever	5	15
Diarrhea and Dysentery	120	95
Measles	985	417
Scarlet Fever	212	258
Diphtheria	24	56
Poliomyelitis	1	4
Meningitis	72	93
Undulant Fever	4	3
Rocky Mountain Spotted Fever	0	0
Tularemia	7	16

PREMATURE BIRTH AND INFANT MORTALITY

Although data relating to the exact number of premature births in the State is unavailable, results of statistical studies made in several parts of the country indicate that between 4 and 5 per cent of all infants are born prematurely. Based upon a conservative rate of 4 per cent, an estimated number of 2,732 premature births occurred in Virginia in 1943 among 68,300 live births. According to preliminary compilations, prematurity took a death toll of 964 infants under one year—about 35 per cent of the prematures last year in the State.

As prematurity plays the chief role among causes of death under one month of age, infant mortality due to this cause may well be studied from a preventive standpoint. Last year in Virginia, there were 1,972 deaths under one month of age from all causes. Of this number 938, or 48 per cent, were due to premature birth. More than one-half of these infants (563) succumbed during the first day of life. Two hundred and sixty-one (28 per cent) lived more than one day but less than one week. One hundred and fourteen (12 per cent) passed the first week but expired before the end of the first month of life.

In addition to neonatal deaths, prematurity was responsible for the deaths of 26 infants between the ages of one and eleven months.

As in the case of infant mortality from all causes, premature birth showed a higher colored death rate (18.9 per 1,000 live births) than white (13.1). Male and female infant deaths have about the same relationship for prematurity as for other causes—a slightly higher rate for males than for females.

A significant association is also seen between premature birth and fetal loss. Among 2,230 stillbirths in the State last year, 941 (42 per cent) were reported to have been of less than nine months' gestation. To these should be added, undoubtedly, a large part of the 362 cases of unknown gestation period.

It is encouraging to note, in the past few years, the expansion of facilities for the care of premature infants, with an increasing number of incubators in the hospitals of the State. Infant mortality due to premature birth, therefore, should show substantial improvement during the coming years.

How to Cough and Not Spread Disease.

There would be fewer colds and much less tuberculosis, influenza, pneumonia, diphtheria, whooping cough and other diseases spread by saliva if people only would learn to cough and sneeze properly, Lieut. Samuel F. Harby, U.S.N.R., points out in the December issue of *Hygeia, The Health Magazine.*

"Whenever you feel a cough or sneeze coming on," he advises, "turn your head away from other people, and cough down at the floor. The thousands of small droplets of saliva which escape inevitably from your mouth as you cough are thus thrown down at the floor, where they have little chance of getting on your associates, and especially into their mouths to cause respiratory infection.

"Even if you were able to cover your mouth completely with your hand, so that no droplets or spray could get by it, you would still fail to protect your associates from your germs, because your hand becomes soiled when you cough on it, and almost immediately afterward you touch other people, or the things which they will touch. Thus, indirectly, germs are transferred from your mouth to some one else's mouth—or what happens more frequently—to some one else's hand, food, eating utensil, or other object which will eventually reach his mouth. . . ."

WOMAN'S AUXILIARY
to the
MEDICAL SOCIETY OF VIRGINIA

President—MRS. W. CLYDE WEST, Alexandria.
President-Elect—MRS. PAUL C. PEARSON, Turpin.
Recording Secretary—MRS. C. C. SMITH, Norfolk.
Corresponding Secretary—MRS. N. G. SCHUMAN, Alexandria.
Treasurer—MRS. REUBEN F. SIMMS, Richmond.
Chairman, Press and Publicity—MRS. E. LATANE FLANAGAN, Richmond.

Cancer Control in Virginia*.

The progress of the work of the Virginia Cancer Foundation is dependent upon the efforts which individual men and women make in the fight against cancer. The philosophy back of the work is inspiring and unselfish. To be able to alleviate suffering and to save lives by one's own efforts produces a feeling of spiritual satisfaction.

The program of the Foundation to be effective involves giving, receiving and applying facts about Cancer Control. Each individual should apply the facts to himself or herself, and then to the well-being of others.

The objectives of the Foundation are Education, Organization and the Diagnosis and Treatment of Medically Indigent Cancer Patients.

Cancer Control Education should enter the homes of all of the 529,089 families in Virginia. It is obvious that this program needs the combined efforts of all intelligent, thinking citizens. Cancer is neither a respecter of race, or creed or color, nor does it stop in front of handsome doorways.

Last year the 100 counties, the 24 independent cities and all of the larger towns in Virginia, had cancer control units. Unfortunately many of these units were not permanent. It is imperative that the cancer control program be made an integrated and permanent part of the life of each community.

In 1943 there were 222 medically indigent cancer patients treated by the Foundation. This was an increase over previous years but many more should have applied for treatment.

The wholehearted cooperation of the Woman's Auxiliary to the Medical Society of Virginia is an urgent need of the Foundation. Each member could be a motivating force in her community in helping—

(1) to get the facts about cancer control into the homes of all the families in Virginia.
(2) to locate the medically indigent cancer patients and to see that they receive prompt and proper treatment.

*This article by our State Commander tells us what we as an Auxiliary can do in helping to banish from our State that dreaded disease, and second killer of our people—Cancer. Now let's get busy, and do our part.

ELLIE COCKE CAMPBELL,
(MRS. HAWES CAMPBELL)
Chairman, Cancer Committee.

Northampton-Accomac Auxiliary.

The regular quarterly meeting of this auxiliary was held at the home of Mrs. Rooker White, Keller, on January 11th, with Mrs. Carey Henderson, president, presiding. Appointment of committee chairmen was announced as follows: Program, Health and Education, Mrs. W. T. Green, Jr.; Social, Mrs. John Robertson; Leigh-Hodges-Wright Memorial, Mrs. O. R. Fletcher; Cancer Control, Mrs. S. K. Ames; Press and Publicity, Mrs. Holland Trower; Historian, Mrs. J. Walker Jackson, Legislature, Mrs. Rooker White; Bulletin, Mrs. S. S. Kellam; Jane Todd Crawford Memorial, Mrs. J. W. Jackson; Hygeia, Mrs. J. L. DeCormis and Mrs. Burleigh N. Mears; Finance, Mrs. J. Fred Edmonds. The Advisory Committee is Drs. J. Walker Jackson and John Robertson. The Auxiliary's Christmas Gift to the Northampton-Accomac Hospital was two bedside cabinets for patients' rooms. After the business meeting, a musical program and social hour were held.

Richmond Auxiliary.

The opening meeting of the Woman's Auxiliary to the Richmond Academy of Medicine was held on January 21st with the new president, Mrs. A. G. Shetter, presiding. Mrs. J. B. Stone presented several excerpts from the State meeting held last October and from the Southern Medical meeting in November. Dr. Morrison Hutcheson spoke to the group on "Pending Medical Legislation". We are looking forward to our February meeting when we will have a letter read on "Prediction of Fifty Years from Today" written by our historian.

MARTHA R. BAGBY.

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The Medical College of Virginia Issue

LAST year when the *Journal of the Iowa State Medical Society* brought out their very attractive University of Iowa number, it occurred to us that we could go them one better since Virginia had two medical schools. Accordingly, the publication committee approached the University of Virginia and the Medical College of Virginia. The present issue is the first fruit of our efforts.

Dr. Rolland J. Main, the professor of Physiology of the Medical College of Virginia, is the acting editor. No number of the MONTHLY has ever been so carefully edited. The reader will miss the errors that are so common in medical *literature*. The adjective, "human", which consequently has no plural form is not employed to denote human beings. Patients and cases are not confused. If the patient has a fever, it is not called a temperature. No gynecological patient will be found between the covers of this number, although patients with gynecological maladies are discussed. If the patient receives the benefits of surgery, he or she is not operated, but operated upon. And finally, the bibliographies are uniform and conform to the best bibliographical usage.

The size of the MONTHLY has been increased for this special number. Nevertheless, several articles have had to be held over. They will appear in future issues when proper credit will be given to the Department of the College in which the work was done.

It has not been the custom for the editor to point his editorial finger at any article appearing in the MONTHLY, but before turning this space over to the acting editor, we cannot refrain from calling attention to the map of the Chimborazo Hospital which was the largest military hospital in the world. The original from which this copy was made is the only one in existence.

Floral Eponym (13)

HOSACKIA BICOLOR—DOUGLAS

DAVID HOSACK (1769-1835), a native of New York City and a graduate of Columbia, began the practice of medicine in Alexandria, Virginia, because he believed it would be the capital of the United States. This venture evidently did not turn out as he expected for after several years he went to London for further study. He then settled in New York where be became the leading surgeon. Dr. Hosack was active in every medical enterprise. He was successively the professor of botany, materia medica, surgery and midwifery, the theory and practice of physic and clinical medicine. His interest in flowers centered in the Elgin Botanic Garden which he founded in 1801 on the present site of Radio City. He was the author of three volumes of medical essays, of numerous articles in the medical journals, and of the life of Dewitt Clinton and Hugh Williams. He was the co-editor of the *Medical and Philosophical Register*. The genus Hosackia contains from forty to fifty species, all American and mostly confined to the Pacific slope. It is closely related to Lotus with which some authors unite it. Hosackia bicolor (Douglas) is found from central California to Washington.

Societies

The Wise County Medical Society

Held its regular meeting on February 18th at Norton, with Dr. R. W. Holley, Appalachia, presiding. There were nineteen members and three visitors present. Following dinner, there was an open discussion of the question of Federal Aid and Socialized Medicine in Virginia and also the Healing Arts Bills. The speakers were Drs. C. B. Bowyer, R. L. Phipps, J. H. Hagy, and Glen Foster. The members then enjoyed a very interesting and well presented talkie-movie in color of otitis media and pediatrics by the Doho Chemical Company. This takes up the entire list of childhood diseases, one at a time, and discusses them with reference to otitis. The film is recommended to other societies as being excellent in subject matter and photography.

Officers for 1944 were elected as follows: President, Dr. Glen Foster, Stonega; vice-presidents, Dr. F. D. Willey, Dunbar, Dr. George C. Snead, Derby, and Dr. E. P. Cox, Norton; secretary-treasurer, Dr. W. B. Barton (re-elected), Stonega; Board of Censors, Drs. D. C. Keister, Imboden, C. L. Harshbarger, Norton, and F. S. Givens, Wise.

The Society enjoyed an average year during 1943, with four regular meetings and with an average attendance of better than 75 per cent of the membership. Two members were lost by death and five members are in the armed forces, which leaves the average age of the remaining doctors in the entire county above 50 years.

W. B. BARTON, *Secretary.*

The Roanoke Academy of Medicine

Held a dinner meeting at Hotel Roanoke on February the 7th. The scientific program was given by two members of the medical staff of the Woodrow Wilson Hospital at Staunton, as follows:

Nervous Reactions in Wartime by Col. John Minor, chief of the Medical Service; and

Perinephritic Abscess by Lt. Col. John H. Lyons, chief of the Surgical Service.

Richmond Academy of Medicine.

At the last regular meeting of the Academy, Dr. E. H. Terrell presiding, Nutrition was the subject for discussion and the following papers were presented:

Nutritional Activities of the State Department of Health by Dr. H. H. Henderson, and

Health Problems in Nutrition by Dr. Walter Wilkins of Washington, D. C.

The usual buffet supper followed the program.

News

Dates Set for State Meeting.

Dates have been set for the next meeting of the Medical Society of Virginia as October 23, 24 and 25. This will be held in Richmond, as previously announced, with headquarters at John Marshall Hotel. Owing to the crowded conditions of hotels, reservations should be made well in advance. This applies to transportation also, as it is easier to cancel than to secure last minute reservations.

Medical College of Virginia News.

Dr. C. C. Coleman, professor of neurosurgery, recently gave a paper on Surgical Treatment of Peripheral Nerve Injuries at the Percy Jones General Hospital, Battle Creek, Michigan.

Dr. William B. Porter, professor of medicine, gave a talk on the Cardio-Diaphragmatic Syndrome at a meeting of the Raleigh Academy of Medicine, Raleigh, N. C., and also attended a meeting of the National Research Council, Washington, D. C., as a member of the committee on drugs and supplies. Later in January he attended the annual meeting of the American Heart Association, being a member of the board of directors of that association.

Dr. J. P. Gray, dean of the school of medicine, and Dr. Harry Walker, associate professor of medicine, attended the annual meeting of the Council on Medical Education and Hospitals of the American Medical Association in Chicago, February 14-15.

Dr. Lewis E. Jarrett, director of the hospital division, attended the meetings of the American Hospital Association in Chicago the week of February 14. Doctor Jarrett is a member of the board of directors.

Dr. Maxwell R. Berry, Jr., assistant professor of medicine, is leaving the institution for Atlanta, Georgia, where he will enter private practice.

Dr. William T. Sanger, president, addressed the Association of Virginia Colleges in annual session in Richmond on February 11.

Dr. Harvey B. Haag, professor of pharmacology, and Dr. Paul Larson, research associate in pharmacology, recently visited the University of Maryland, speaking to the staff of the hospital on The Use of Tobacco in Health and Disease.

The Valentine Meat Juice Company has made a grant of $200.00 for scholarships in the school of pharmacy.

The annual Stuart McGuire lectures are tentatively set for April 5 and 6. Dr. Finley Gayle, professor of neuropsychiatry, is chairman of the committee, and it is anticipated that the lectures this year will be in the field of neuropsychiatry.

News from the University of Virginia, Department of Medicine.

The Phi Beta Pi Medical Fraternity presented Dr. Karl Menninger, of the Menninger Clinic, Kansas City, Missouri, in a lecture on January 14th. His subject was "Psychiatry in Medicine".

Dr. Fletcher D. Woodward attended a meeting of the Sub-Committee on Otolaryngology, Division of Surgery, of the National Research Council in Washington on Friday, January 21st. He recently accepted appointments to the National Faculties in Broncho-Esophagology and in Otolaryngology of the War-Time Graduate Medical Meetings organized for medical officers in the Armed Forces and civilian doctors under the auspices of the American Medical Association, The American College of Physicians and the American College of Surgeons.

On January 24th at the University of Virginia Medical Society meeting, Dr. C. H. Mann of New York spoke on "Lympogranuloma Venereum".

Dr. Henry B. Mulholland spoke on February 2nd at the Augusta County Medical Society at King's Daughters' Hospital in Staunton. His subject was "Federalized Medicine".

On January 12th he spoke on "The Diagnosis and Treatment of the Pneumonias" at the James River Medical Society meeting at Dillwyn.

The annual Sigma Xi lecture was given on February 9th by Dr. K. C. D. Hickman, research chemist of the Eastmam Kodak Company, on the subject, "Low Pressure Distillation and Vitamin Production".

Dr. E. P. Lehman and Dr. W. H. Parker attended the meeting of the Society of University Surgeons at Vanderbilt University, February 9th through 12th.

Personnel Changes in the State Department of Health.

Dr. Thomas Scarlett, Health Officer of Harrisonburg, resigned effective February 12th to enter the armed forces.

Dr. T. F. McGough, Health Officer of Pulaski-Wythe Health District, Pulaski, resigned effective February 16th. He has also entered the armed forces.

Dr. D. C. Steelsmith, Health Officer of Halifax-Pittsylvania Health District, South Boston, has resigned effective April 1st.

Promotions in the Service.

Promotions of the following Virginia doctors in the Service have recently been noted:

To Lieutenant Colonel—

Dr. William Linwood Ball, Richmond.

To Major—

Dr. George R. Carpenter, Fairfax.
Dr. Joseph Lee Mann, Hampton.
Dr. Wilmer H. Paine, Charlottesville.
Dr. William R. Watkins, South Boston.

To Captain—

Dr. Donald L. Arey, Danville.
Dr. Harry Brick, Richmond.
Dr. George Stone Ferrell, Lynchburg.
Dr. John F. Gayle, Newport News.
Dr. William Cecil Graham, Richmond.
Dr. Lemuel E. Mayo, Portsmouth.
Dr. W. Lowndes Peple, Jr., Richmond.
Dr. Henkel Moser Price, Martinsville.

Dr. G. B. Arnold,

For sometime superintendent of the Lynchburg State Colony, recently resigned this position and has located in Lynchburg, with offices at 901 Allied Arts Building. He will limit his practice to internal medicine, neurology and psychiatry.

Dr. Herman F. Oppleman,

After nearly two years with Armed Forces in the southwest Pacific, has been retired from the Service because of physical disability, and has resumed general practice in Richmond, where he is associated with Dr. Richard S. Herring, with offices at 923 West Franklin Street.

Dr. Frank F. Thweatt, Jr.,

Senior Surgeon, USPHS., has been transferred from Washington, D. C., to Portland, Maine, where he is Medical Officer in Charge of the U. S. Marine Hospital. He is a graduate of the University of Virginia, Department of Medicine, in 1928.

The Richmond Society of Ophthalmology-Otorhinolaryngology,

At a dinner meeting at the Commonwealth Club on February 1st, presented the following program: The Eye and Ear Program of the Public Schools by Dr. C. L. Outland; Lip Reading by Miss Alice Burnett; and Work of the Virginia Commission for the Blind by Dr. S. Trattner. Dr. Peter N. Pastore is president of this Society and Dr. Clifford Folkes secretary.

Dr. Harvey H. Haag,

Professor of Pharmacology at the Medical College of Virginia, Richmond, who for several years has been a member of the Committee on National Formulary and Chairman of its sub-committee on Pharmacology and Posology, has recently been appointed to the General Committee of Revision of the United States Pharmacopoeia. These appointments have to do with the selection of drugs, the quality and standardization of which are to be given official legal recognition. The National Formulary is sponsored by the American Pharmaceutical Association, while the work of the United States Pharmacopoeia is carried on by representatives of the pharmaceutical, medical, dental, veterinary and chemical professions. Dr. Haag is the only person from Virginia on either of these two committees.

Dr. J. R. Saunders,

Formerly of Madison Heights, is now located at 1105 Allied Arts Building, Lynchburg, where he is engaged in general practice and obstetrics.

Dr. Hilmar R. Schmidt,

Formerly of Petersburg, is now located in Elkins, W. Va., where he is roentgenologist at the Golden Clinic.

Qualified Men Desired as Naval Officers.

Lieutenant Commander W. N. Davies, Director of Naval Officer Procurement for the Fifth Naval District, announces an acceleration in the Navy's Officer Procurement Program. Under present quota limits, many qualified men will be offered direct commis-

sions in the U. S. Naval Reserve for general sea duty.

Men up to thirty-five are eligible to apply if they meet the requirements set forth in the Officer Qualifications Manual and provided (1) they are in good physical condition with visual acuity of at least 15/20 in each eye without glasses and correctible to 20/20 with glasses, (2) they are college graduates with good scholastic record, (3) they have an acceptable business record, if employed, and (4) they have had experience in the direct handling of men and are able to operate effectively under stress.

Any men having extensive small boat experience in open waters would be considered even though their college work had not been completed, the Director stated. This consideration would also be extended to men between thirty and thirty-five who have not completed their college work, provided they have had an unusual amount of experience along lines valuable to the Navy and if they have been outstandingly successful in their vocation.

General sea duty has a high priority at this time and Commander Davies suggests that all eligible and interested men immediately write to or visit the Office of Naval Officer Procurement, either at Fifth and Cary Streets, Richmond 19, Virginia, or Kanawha Hotel, Charleston 1, West Virginia.

Dr. W. H. Turner, Jr.,

Recently of Round Hill, is now located at 182 Elm St., Oberlin, Ohio.

Major Grant R. Elliott, M.C.,

Of Orange, has returned from overseas duty with the Eighth Air Force in England where he has been for eighteen months. He is now in the Medical and Psychological Examining Unit No. 4, located at Greensboro, N. C.

Borden's Biolac Changes in Size.

Biolac, the modified evaported milk manufactured by the Borden Company, will be further concentrated and its new container will be 13 ounces in capacity, in comparison with the present 16 ounce size. The new container will effect a savings in metal, labels and storage space, as well as permit a reduction in shipping weight.

Children's Memorial Clinic, Richmond.

Dr. Manfred Call, III, was elected president of this Clinic at its annual meeting on January 25th. Other doctors among the officers are Dr. Howard R. Masters, vice-president, and Dr. Harvie DeJ. Coghill, secretary.

The Neuropsychiatric Society of Virginia

Held its annual meeting in the Richmond Academy of Medicine Building, Richmond, on February the 16th, under the presidency of Dr. Joseph R. Blalock of Marion, at which time the following papers were presented:

Pathology of Head Injuries Presenting Gross and Microscopic Demonstrations by Dr. John S. Howe, of the Department of Pathology, Medical College of Virginia;

Some Neuropsychiatric Complications of Head Injuries by Dr. Frank H. Redwood of Norfolk; and

Cases of Psychoses Following Head Injuries by Dr. J. F. Phillips of Central State Hospital, Petersburg.

These were followed by the showing of interesting movies demonstrating scientific work being done in Russia.

At the dinner held later at Commonwealth Club, there was a discussion of the Neuropsychiatric Program in Virginia and officers were elected for the ensuing year. These are: President, Dr. O. B. Darden of Richmond; vice-president, Dr. D. L. Harrell of Staunton; and secretary, Dr. J. Asa Shield (re-elected), Richmond.

The American Physicians' Art Association

Will have its seventh annual exhibit at the A.M.A. convention, Stevens Hotel, Chicago, June 12-16, 1944.

Everyone was impressed by the beauty of the Art Exhibition at the Atlantic City Session last year, but the 1944 Gallery in the main ballroom balcony will be even more beautiful and impressive.

Through the courtesy of Mead Johnson & Co., Evansville, Ind., there will be no fees for hanging and no express charges either way. The type of art to be exhibited includes personal work of the following types of medium: oil portraits, oil still life, landscapes, sculpture, water color, pastels, etchings, photography, wood carving, leather tooling, ceramics and tapestries (needle work). All pieces should be sent preferably by railway express collect, automatically covered with $50 insurance.

Exhibitors should send NOW for entry blanks to Dr. Francis H. Redewill, Secretary, A.P.A.A., Flood Building, San Francisco; one entry blank should be used for each medium in which it is desired to

exhibit.

There will be about 100 trophies, including medals and plaques.

Color Films.

The motion picture in color, "Continuous Caudal Analgesia in Obstetrics," which was made available by Eli Lilly and Company, Indianapolis, for showing before medical societies and hospital staffs, has been in continuous demand since release several months ago. It was made at the U. S. Marine Hospital, Staten Island, by authorization of the Surgeon General, U. S. Public Health Service, and the demonstrations were carried out by Drs. Hingson and Edwards, originators of the technic.

The three films that were made at the Nutrition Clinic of the University of Cincinnati in the Hillman Hospital, Birmingham, Alabama, under the joint auspices of the Department of Internal Medicine at the University of Cincinnati and the University Hospitals of Cleveland have likewise been in constant circulation. One of these deals with thiamin chloride deficiency, one with nicotinic acid deficiency, and the third with ariboflavinosis.

None of the films contains advertising. They are available to physicians for showing before medical societies and hospital staffs.

Obituaries

Dr. Dennie Marvin Thomasson,

Well known physician of Lynchburg, died February 18th. He was sixty-five years of age and a graduate of the University of Virginia, Department of Medicine, in 1900. Dr. Thomasson had practiced in Lynchburg since his graduation and was at one time on the Lynchburg public health staff. In late years he had specialized in proctology and was a fellow of the American Proctological Society. Dr. Thomasson had been a member of the Medical Society of Virginia since 1903.

Dr. Arthur Grayson Vaden,

Of Temperanceville, well known physician of the Eastern Shore of Virginia, died in a Richmond hospital, on February 1st, after a long illness. He was seventy years of age and studied medicine at the former University College of Medicine in Richmond, from which he graduated in 1895. Before moving to "The Shore", he practiced for sometime in Mathews. He had been a member of the Medical Society of Virginia since 1897. His wife and a son survive him.

Dr. William Mann Randolph,

Prominent physician of Charlottesville, died January 25th after an extended illness. He was seventy-four years of age and graduated in medicine from the University of Virginia in 1890. Dr. Randolph practiced in Charlottesville until 1913, returning there in 1928. He saw extended military service, being captain of Troop K, Albemarle Light Horse, from 1892 to 1897, and a major in the 17th Infantry, Virginia Volunteers, 1898-1904. He served during the World War with the rank of major. Following his return to Charlottesville, Dr. Randolph was connected with the Tuberculosis Control of the State Department of Health. He held many professional and civic positions, and had been a member of the Medical Society of Virginia for many years. His wife and seven children survive him.

Dr. Walter S. Quaintance,

Slate Mills, died February 3rd of heart disease. His death occurred just one month after that of his father, Dr. Oscar R. Quaintance. He was sixty-two years of age, and he graduated in medicine and dentistry from the Medical College of Virginia in 1882. Dr. Quaintance had practiced both professions at Slate Mills since shortly after his graduation. His brother, Dr. Rupert Wilson Quaintance, Lundale, W. Va., survives him.

Dr. James Tayloe Gwathmey,

A leading authority on anesthesia, who practiced for a number of years in New York City, and was formerly anesthetist at the New York Skin and Cancer Hospital, died February the 11th in the U. S. Veterans Hospital at Fayetteville, Ark. He was a native of Norfolk, eighty years of age, and graduated in medicine from Vanderbilt University in 1899. A daughter and son survive him.

Dr. Norborne T. Greer,

Of Rocky Mount, died January the 25th. He was seventy-five years of age and graduated in medicine from the Univrsitey of Maryland in Baltimore in 1892. He practiced for several years in Hopewell, about time of World War I. His wife and several children survive him.

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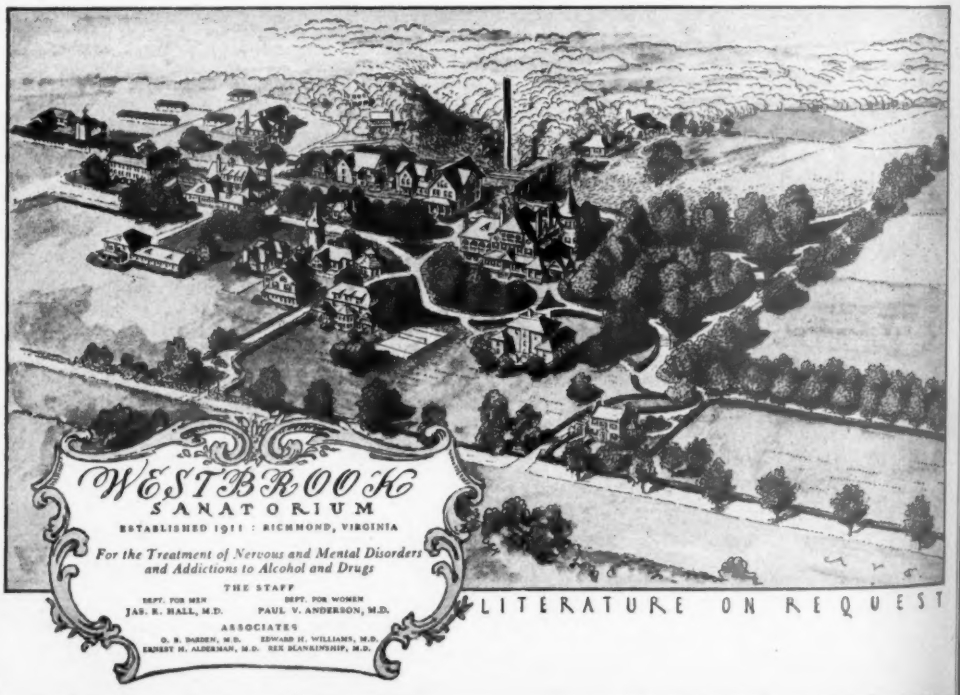
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Accomac County	C. E. Critcher, New Church	J. C. Doughty, Onancock	Quarterly.
Albemarle County	W. W. Waddell, Jr., University	W. R. Mason, University Charlottesville	Monthly.
Alexandria City	S. H. Williams, Alexandria	Alfred Abramson, Alexandria	Monthly.
Alleghany-Bath Counties	L. A. Houff, Clifton Forge	R. P. Hawkins, Clifton Forge	Bi-Monthly.
Amelia County	G. A. Arhart, Amelia	J. L. Hamner Mannboro	
Arlington County	J. E. Payne, Arlington	J. A. Cope, Arlington	January, April, July, August.
Augusta County	A. M. McLaughlin, Waynesboro	George Kinser, Waynesboro	February, May, August, November.
Bedford County	M. P. Rucker, Bedford	W. V. Rucker, Bedford	Quarterly.
Botetourt County	L. A. Micou, Eagle Rock	E. B. Morgan, Fincastle	
Charlotte County	C. M. Nicholson, Charlotte C. H.	J. R. Bailey, Keysville	
Clinch Valley Med. Society	C. H. Henderson, Norton	C. B. Bowyer, Stonega	Spring and Fall.
Culpeper County	J. L. Stringfellow, Culpeper	O. K. Burnette, Culpeper	
Danville-Pittsylvania	J. J. Neal, Danville	P. W. Miles, Danville	
County Division	H. H. Hamner, Chatham	G. V. Thompson, Chatham	
Dickenson-Buchanan Counties	J. C. Trivett, Page	T. C. Sutherland, Haysi	
Elizabeth City County	R. H. Wright, Phoebus	J. Lee Mann, Hampton	
Fairfax County	E. S. Waring, Fairfax	Alice Keissling, Falls Church	February, May, August, November.
Fauquier County	Stewart McBryde, Manassas	J. Frank Folk, Warrenton	Monthly.
Floyd County	S. T. Yeatts, Floyd	F. C. Bedsaul, Floyd	
Fourth District and Southside	T. S. Jennings, Waverly	C. E. Martin, Emporia	5 times a year.
Fredericksburg Med. Assn.	F. C. Pratt, Fredericksburg	L. A. Busch, Fredericksburg	Monthly.
Halifax County	L. P. Bailey, Nathalie	W. C. Brann, South Boston	
Hanover County	J. A. Wright, Doswell	J. D. Hamner, Ashland	Bi-Monthly.
Hopewell Med. Assn.	A. T. Brickhouse, Hopewell	W. M. Phipps, Hopewell	
Isle of Wight County	Rea Parker, Smithfield		
James River Med. Society	J. H. Yeatman, Fork Union	Garland Dyches, Dillwyn	Quarterly.
Lee County	J. H. Dellinger, Pennington Gap	C. H. Henderson, Bonny Blue	
Loudoun County	W. O. Bailey, Leesburg	G. H. Musgrave, Leesburg	Monthly.
Louisa County	H. G. Byrd, Louisa	E. B. Pendleton, Cuckoo	
Lynchburg Academy	S. H. Rosenthal, Lynchburg	L. R. O'Brian, Jr. Lynchburg	Monthly.
Mecklenburg County	H. H. Braxton, Chase City	W. W. Wilkinson, LaCrosse	
Med. Assn. Valley of Virginia	T. Rolston, New Hope	H. W. Miller, Woodstock	September.
Med. Soc. Northern Virginia	C. O. Dearmont, White Post	J. E. Harris, Winchester	
Medical Society of Virginia	C. B. Bowyer, Stonega	Agnes V. Edwards, Richmond	Richmond, Oct. 23-25, 1944.
Mid-Tidewater Med. Society	H. A. Tabb, Gloucester	M. H. Harris, West Point	January, April, July, October.
Nansemond County	E. C. Joyner, Suffolk	H. D. Crow, Suffolk	
Nelson County	Lyddane Miller, Amherst	J. F. Thaxton, Tye River	
Norfolk County	N. F. Rodman, Norfolk	L. B. Scott, Norfolk	Semi-Monthly
Northampton County	W. T. Green, Nassawadox	W. C. Henderson, Nassawadox	Quarterly.
Northern Neck	M. C. Oldham, Kilmarnock	Lee S. Liggan, Irvington	Spring and Fall.
Orange County	J. P. Hankins, Orange		
Patrick-Henry Counties	R. H. Walker, Martinsville	T. H. Dickerson, Martinsville	January, April, July, October.
Piedmont Med. Society	Percy Harris, Scottsville	E. D. Davis, Crozet	
Princess Anne County	R. W. Woodhouse, Va. Beach	R. A. Stata, Oceana	
Richmond Academy	E. H. Terrell, Richmond	Mary N. Godbold, Richmond	2nd and 4th Tuesdays.
Roanoke Academy	A. M. Groseclose, Roanoke	D. S. Garner, Roanoke	1st and 3rd Mondays.
Rockbridge County		E. P. Tompkins, Lexington	
Rockingham County	H. Grant Preston, Harrisonburg	Thos. Scarlett, Harrisonburg	2nd Mondays, Feb., May, Aug., Nov.
Russell County	T. G. Smith, Lebanon, R. D.	W. C. Elliott, Lebanon, R. D.	
Scott County	C. R. Fugate, Clinchport		
Seaboard Med. Assn.	M. A. Pittman, Wilson, N. C.	C. P. Jones, Newport News	Wilson, N. C., 1944.
Southampton County	Morgan Raiford, Franklin	W. T. McLemore, Courtland	April and September.
South Piedmont Med. Society	Bernard H. Kyle, Lynchburg	F. O. Plunkett, Lynchburg	Spring and Fall.
Southwestern Virginia	A. B. Graybeal, Marion	G. C. Williams, Pearisburg	April and September.
Tazewell County	J. W. Witten, N. Tazewell	J. A. Robinson, Richlands	
Tri-State Med. Assn. Va. & N. C.	A. G. Brenizer, Charlotte, N. C.	J. M. Northington, Charlotte, N. C.	
Va. Orthopedic Society	J. B. Dalton, Richmond	J. T. Tucker, Richmond	Richmond, Oct. 23-25, 1944.
Va. Pediatric Society	E. A. Harper, Lynchburg	Emily Gardner, Richmond	Richmond, Oct. 23-25, 1944.
Va. Peninsula Acad. Med.	W. R. Payne, Newport News	R. H. Wright, Phoebus	3rd Mondays.
Va. Radiological Society	C. W. Eley, Norfolk	E. L. Flanagan, Richmond	Richmond, Oct. 23-25, 1944.
Va. Soc. Chest Physicians	F. B. Stafford, Sanatorium	E. C. Harper, Richmond	
Va. Society of Obst. & Gyn.	A. L. Carson, Richmond	L. L. Shamburger, Richmond	Richmond, Oct. 23-25, 1944.
Va. Society of O. L. & O.	E. T. Gatewood, Richmond	Meade Edmunds, Petersburg	Lynchburg, April 29, 1944.
Va. Urological Society	T. B. Washington, Richmond	W. W. Koontz, Lynchburg	Richmond, Oct. 23-25, 1944.
Warwick County	Paul Hogg, Newport News	E. D. Blechman, Newport News	Monthly.
Williamsburg-James City	A. M. Sneed, Toano	I. S. Zfass, Williamsburg	
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* *Laryngoscope, Feb. 1935, Vol XLV, No. 2, 149-154*

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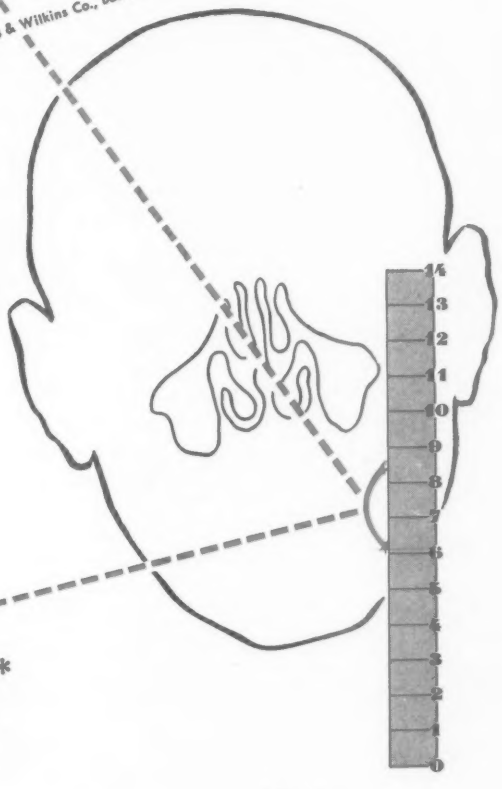

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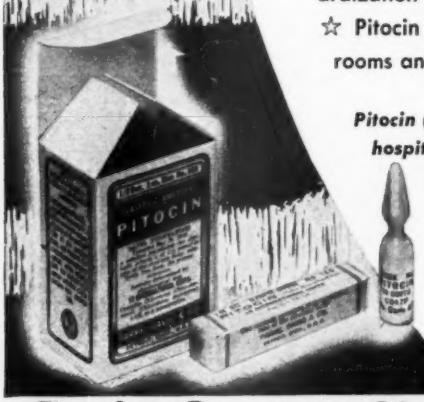
● A sterile, aqueous solution of the oxytocic principle of the posterior pituitary with practically none of the pressor principle . . . a superior product for all cases in which stimulation of the uterine musculature during labor is indicated. PITOCIN* is also indicated for the prevention of postpartum hemorrhage, and is *especially desirable* in those cases in which a rise in blood pressure is contraindicated. ☆ The low protein content and freedom from impurities minimize the incidence of reactions. Meticulous standardization and marked stability assure uniformity of action. ☆ Pitocin has justly earned an important place in delivery rooms and obstetrical kits the world over.



Pitocin (alpha-hypophamine) is available from your pharmacy or hospital dispensary in ampoules of 0.5 cc. and 1 cc., in boxes of 6, 25, and 100.

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FOR supplying Mercurochrome and other drugs, diagnostic solutions and testing equipment required by the Armed Forces, for developing and producing Sterile Shaker Packages of Crystalline Sulfanilamide especially designed to meet military needs, and for completing deliveries ahead of contract schedule—these are the reasons for the Army-Navy "E" Award to our organization.

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For the convenience of physicians Mercurochrome is supplied in four forms—Aqueous Solution for the treatment of wounds, Surgical Solution for preoperative skin disinfection, Tablets and Powder from which solutions of any desired concentration may readily be prepared.

Mercurochrome (H. W. & D Brand of dibrom-oxy-mercuri-fluorescein-sodium) is economical because stock solutions may be dispensed quickly and at low cost by the physician or in the dispensary. Stock solutions keep indefinitely. Literature furnished to physicians on request.

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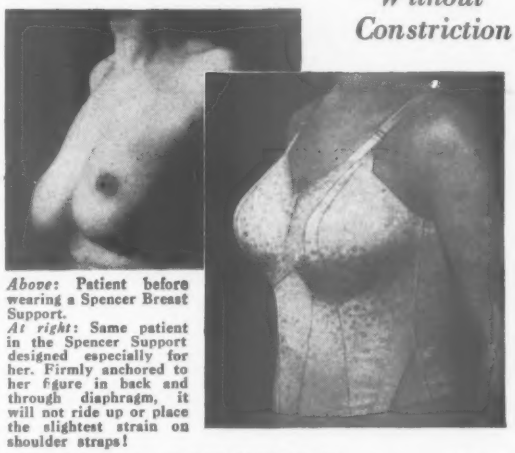
DEFINITE UPLIFT FOR THE HEAVIEST PTOSED BREASTS!

This Spencer Support Holds Breasts in Natural Position Without Constriction



Above: Patient before wearing a Spencer Breast Support.
At right: Same patient in the Spencer Support designed especially for her. Firmly anchored to her figure in back and through diaphragm, it will not ride up or place the slightest strain on shoulder straps!

IMPROVES CIRCULATION of the blood through the breasts, lessening the chance of the formation of non-malignant nodules, and improving tone.

PROVIDES COMFORT AND AIDS BREATHING when worn by women who have large ptosed breasts.

AIDS MATERNITY PATIENTS by protecting inner tissues and helping prevent outer skin from stretching and breaking.

HELPS NURSING MOTHERS by guarding against caking and abscessing.

Individually designed for each patient.

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SPENCER *INDIVIDUALLY DESIGNED*

Abdominal, Back and Breast Supports

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Please send me booklet, "How Spencer Supports Aid the Doctor's Treatment."

.....M. D.

Address X-8

THEORETICALLY, a woman has the opportunity of conceiving thirteen times a year. Accordingly, the results of contraceptives are based upon woman-months of exposure. The effectiveness of Ortho-Gynol Vaginal Jelly has been established by clinical observations involving thousands of woman-years. These investigations have been conducted in hospitals, public health departments and clinics. The efficacy of Ortho-Gynol Vaginal Jelly can be attributed to its spermicidal activity and its uniform physical and chemical properties.

When prescribing Ortho-Gynol Vaginal Jelly, the clinician can anticipate satisfactory results.

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VAGINAL JELLY

ACTIVE INGREDIENTS: *Ricinoleic Acid, Boric Acid, Oxyquinoline Sulfate.*

FOR THE CONSTIPATION OF PREGNANCY . . .

●Pressure of the fetus, lack of exercise and altered diet are factors which may induce constipation during pregnancy.

Restoration and maintenance of "habit time" is of prime importance to the patient's well-being.

Petrogalar gently, persistently, *safely* helps to establish "habit time" for bowel movement.

Petrogalar augments the intestinal contents by supplying unabsorbable fluid. It is evenly disseminated throughout the bowel effectively penetrating and softening hard, dry feces resulting in comfortable elimination with no straining . . . no discomfort.

Petrogalar is an aqueous suspension of pure mineral oil each 100 cc. of which contains 65 cc. pure mineral oil suspended in an aqueous jelly. Five types of Petrogalar provide convenient variability for individual needs.

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NUTRITIONAL ANEMIA IN INFANTS

REASONS FOR EARLY FEEDING OF PABLUM (OR PABENA)

1. The infant's initial store of iron is rapidly depleted during the first months of life. (Mackay,[1] Elvehjem[2]). About 30% of the iron freed from the hemoglobin during the first two months is lost, and while hemoglobin destruction takes place, all infants are in negative iron balance. (Jeans,[3] and Usher, et al.[4]).

2. During the early months of life the infant obtains very little iron from milk — 1.44 mg. per day from the average bottle formula of 20 ounces or possibly 1.7 mg. per day from 28 ounces of breast milk. (Holt,[5] Jeans[3]). The incidence of nutritional anemia has been found to be high among infants confined largely to a diet of cow's milk. (Davidson, et al.[6] Usher, et al.,[4] Mackay[1]).

For these reasons and also because of the low hemoglobin values so frequent among pregnant and nursing mothers (Strauss,[7] and Gottlieb and Strean[8]), the pediatric trend is constantly toward the addition of iron-containing foods at an early age, both to normal infants and those with pylorospasm. (Neff,[9] Blatt,[10] Brennemann,[11] Monypenny[12]).

THE CHOICE OF THE IRON-CONTAINING FOOD

1. Many foods high in iron actually add very little to the diet because much of the mineral is lost in cooking or because the amount fed is necessarily small or because the food has a high percentage of water. Strained spinach, for instance, contains only 1 to 1.4 mg. of iron per 100 Gm. (Bridges[13]).

2. To be effective, food iron should be soluble. Some foods fairly high in total iron are low in soluble iron. Thus egg yolk and liver have less soluble iron than does farina, which is very low in total iron. (Summerfeldt[14]). Oxalate-containing leafy vegetables are low in soluble iron and appear not to be well utilized as a source of iron by infants. (Kohler, et al.,[15] and Stearns[16]).

3. **Pablum (and Pabena) are high both in total iron (30 mg. per 100 Gm.) and soluble iron (7.8 mg. per 100 Gm.) and can be fed in significant amounts at an early age, without digestive upsets. (Blatt,[10] Monypenny[12]). Clinical studies of sick and well babies have shown Pablum to be of value in raising hemoglobin values (Crimm, et al.,[17] Summerfeldt and Ross[18]), even when egg yolk and spinach were not effective (Stearns[16]).**

Pablum, a palatable mixed cereal food, vitamin and mineral enriched, and cooked thoroughly and dried, consists of wheatmeal (farina), oatmeal, wheat embryo, cornmeal, powdered beef bone, sodium chloride, alfalfa leaf, brewers' yeast, and reduced iron. (The oatmeal form of Pablum is called Pabena.)

[1-18] **Bibliography on request.**

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